OM-745 201 170A

May 2002

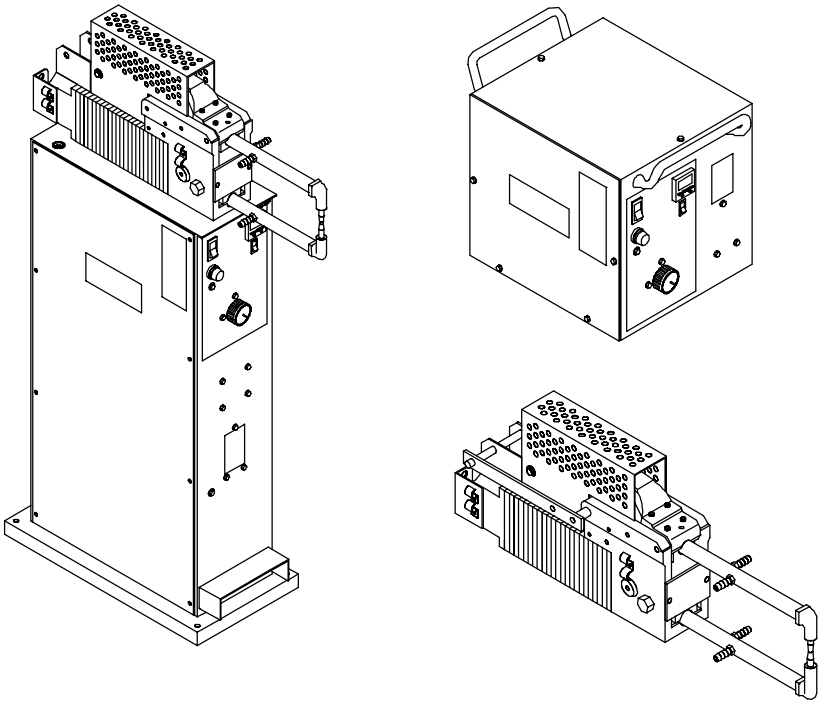
Processes

Resistance Spot Welding

Description

1 Phase

PSW-1020ATT, PSW-2020ATT, SSW-1020ATT, SSW-2020ATT, And SSW-2040ATT



OWNER'S MANUAL

Visit our website at

www.MillerWelds.com

From Miller to You

Thank you and *congratulations* on choosing Miller. Now you can get the job done and get it done right. We know you don't have time to do it any other way.

That's why when Niels Miller first started building arc welders in 1929, he made sure his products offered long-lasting value and superior quality. Like you, his customers couldn't afford anything less. Miller products had to be more than the best they could be. They had to be the best you could buy.

Today, the people that build and sell Miller products continue the tradition. They're just as committed to providing equipment and service that meets the high standards of quality and value established in 1929.

This Owner's Manual is designed to help you get the most out of your Miller products. Please take time to read the Safety precautions. They will help you protect yourself against potential hazards on the worksite. We've made installation and operation quick and easy. With Miller you can count on years of reliable service with proper maintenance. And if for some reason the unit needs repair, there's a Troubleshooting section that will help you figure out what the problem is. The parts list will then help you to decide the exact part you may need to fix the problem. Warranty and service information for your particular model are also provided.

ISO 9001 REGISTERED QUALITY SYSTEM

Miller is the first welding equipment manufacturer in the U.S.A. to be registered to the ISO 9001 Quality System Standard.

Miller Electric manufactures a full line of welders and welding related equipment. For information on other quality Miller products, contact your local Miller distributor to receive the latest full line catalog orindividual catalog sheets. **To locate your nearest distributor or service agency call 1-800-4-A-Miller, or visit us at www.MillerWelds.com on the web.**

TRUE BLUE® WARRANTY

Working as hard as you do – every power source from Miller is backed by the most hassle-free warranty in the business.

Miller offers a Technical Manual which provides more detailed service and parts information for your unit. To obtain a Technical Manual, contact your local distributor. Your distributor can also supply you with Welding Process Manuals such as SMAW, GTAW, GMAW, and GMAW-P.

Miller®

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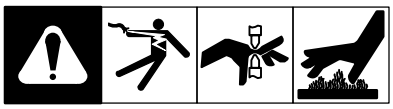
SECTION 1 – SAFETY PRECAUTIONS - READ BEFORE USING

1-1. Symbol Usage

Means Warning! Watch Out! There are possible hazards with this procedure! The possible hazards are shown in the adjoining symbols.

▲ **Marks a special safety message.**

☞ *Means "Note"; not safety related.*



This group of symbols means Warning! Watch Out! possible ELECTRIC SHOCK, MOVING PARTS, and HOT PARTS hazards. Consult symbols and related instructions below for necessary actions to avoid the hazards.

1-2. Resistance Spot Welding Hazards

▲ **The symbols shown below are used throughout this manual to call attention to and identify possible hazards. When you see the symbol, watch out, and follow the related instructions to avoid the hazard. The safety information given below is only a summary of the more complete safety information found in the Safety Standards listed in Section1-4. Read and follow all Safety Standards.**

▲ **Only qualified persons should install, operate, maintain, and repair this unit.**

▲ **During operation, keep everybody, especially children, away.**

SPOT WELDING can cause fire.

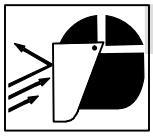
Sparks can fly off from the weld. The flying sparks, hot workpiece, and hot equipment can cause fires, burns, and explosions.

- Protect yourself and others from flying sparks and hot metal.
- Do not spot weld where flying sparks can strike flammable material.
- Remove all flammables within 35 ft (10.7 m) of the weld. If this is not possible, tightly cover them with approved covers.
- Be alert that welding sparks can easily go through small cracks and openings to adjacent areas.
- Watch for fire, and keep a fire extinguisher nearby.
- Do not spot weld on closed containers such as tanks or drums.
- Do not weld where the atmosphere may contain flammable dust, gas, or liquid vapors (such as gasoline).
- Remove any combustibles, such as a butane lighter or matches, from your person before doing any welding.
- After completion of work, inspect area to ensure it is free of sparks, glowing embers, and flames.
- Do not exceed the equipment rated capacity.
- Use only correct fuses or circuit breakers. Do not oversize or bypass them.

ELECTRIC SHOCK can kill.

Touching live electrical parts can cause fatal shocks or severe burns. The input power circuit and machine internal circuits are also live when power is on. Incorrectly installed or improperly grounded equipment is a hazard.

- Do not touch live electrical parts.
- Wear dry, hole-free insulating gloves and body protection.
- Disconnect input power before installing or servicing this equipment. Lockout/tagout input power according to OSHA 29 CFR 1910.147 (see Safety Standards).
- Properly install and ground this equipment according to this manual and national, state, and local codes.
- Check and be sure that input power cord ground wire is properly connected to ground terminal in disconnect box or that cord plug is connected to a properly grounded receptacle outlet – always double-check the supply ground before applying power.
- When making input connections, attach the grounding conductor first – double-check connections.
- Keep cords dry, free of oil and grease, and protected from hot metal and sparks.
- Frequently inspect input power cord and ground conductor for damage or bare wiring – replace immediately if damaged – bare wiring can kill. Check ground conductor for continuity.
- Turn off all equipment when not in use.
- For water-cooled equipment, check and repair or replace any leaking hoses or fittings. Do not use any electrical equipment if you are wet or in a wet area.
- Use only well-maintained equipment. Repair or replace damaged parts at once.
- Wear a safety harness if working above floor level.
- Keep all panels, covers, and guards securely in place.



FLYING SPARKS can cause injury.

Very often sparks fly off from the joint area.

- Wear approved face shield or safety goggles with side shields.

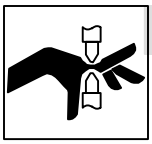
- Wear protective garments such as oil-free, flame-resistant leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap. Synthetic material usually does not provide such protection.
- Protect others in nearby areas by using approved flame-resistant or noncombustible fire curtains or shields. Have all nearby persons wear safety glasses with side shields.

HOT METAL can cause burns.

Wear gloves or allow cooling period before servicing tongs or tips.

- Always wear welding-type, insulated gloves when using this equipment.

- Do not touch workpiece, tips, or tongs with bare hands.
- Allow tongs and tips to cool before touching.



MOVING PARTS can cause injury.

The tong tips, tongs, and linkages move during operation.

- Keep away from moving parts.
- Keep away from pinch points.
- Do not put hands between tips.
- Keep all guards and panels securely in place.
- OSHA and/or local codes may require additional guarding to suit the application.

FUMES can be hazardous.

Coatings, cleaners, paints, and platings can produce fumes when welded. Breathing these fumes can be hazardous to your health.

- Do not breathe the fumes.
- If inside, ventilate the area and/or use exhaust at the weld to remove fumes.
- In confined spaces, use an approved air-supplied respirator.
- Do not weld on coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the weld area, the area is well ventilated, or if necessary, while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if welded.
- Read the Material Safety Data Sheets (MSDSs) and the manufacturer's instructions for metals, coatings, and cleaners.

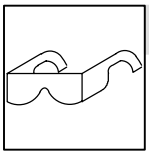
1-3. Additional Symbols For Installation, Operation, And Maintenance

FIRE OR EXPLOSION hazard.

- Do not install or place unit on, over, or near combustible surfaces.
- Do not install or operate unit near flammables.
- Do not overload building wiring – be sure power supply system is properly sized, rated, and protected to handle this unit.

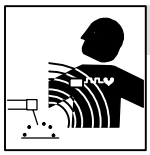
FALLING EQUIPMENT can cause injury.

- Use equipment of adequate capacity to lift the unit.
- Have two people of adequate physical strength lift portable units.
- Secure unit during transport so it cannot tip or fall.



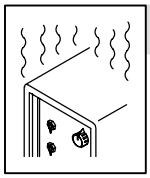
FLYING METAL or DIRT can injure eyes.

- Wear approved safety glasses with side shields or wear face shield.



MAGNETIC FIELDS can affect pacemakers.

- Pacemaker wearers keep away.
- Wearers should consult their doctor before going near resistance spot welding operations.



OVERUSE can cause OVERHEATING.

- Allow cooling period; follow rated duty cycle.
- Reduce duty cycle before starting to weld again.

1-4. Principal Safety Standards

Safety in Welding and Cutting, ANSI Standard Z49.1, from American Welding Society, 550 N.W. LeJeune Rd, Miami FL 33126

Safety and Health Standards, OSHA 29 CFR 1910, from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

National Electrical Code, NFPA Standard 70, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

Code for Safety in Welding and Cutting, CSA Standard W117.2, from Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3.

Safe Practices For Occupation And Educational Eye And Face Protection, ANSI Standard Z87.1, from American National Standards Institute, 1430 Broadway, New York, NY 10018.

Cutting And Welding Processes, NFPA Standard 51B, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

1-5. EMF Information

Considerations About Welding And The Effects Of Low Frequency Electric And Magnetic Fields

Welding current will cause electromagnetic fields. There has been and still is some concern about such fields. However, after examining more than 500 studies spanning 17 years of research, a special blue ribbon committee of the National Research Council concluded that: "The body of evidence, in the committee's judgment, has not demonstrated that exposure to power-frequency electric and magnetic fields is a human-health hazard." However, studies are still going forth and evidence continues to be examined.

SECTION 2 – INSTALLATION

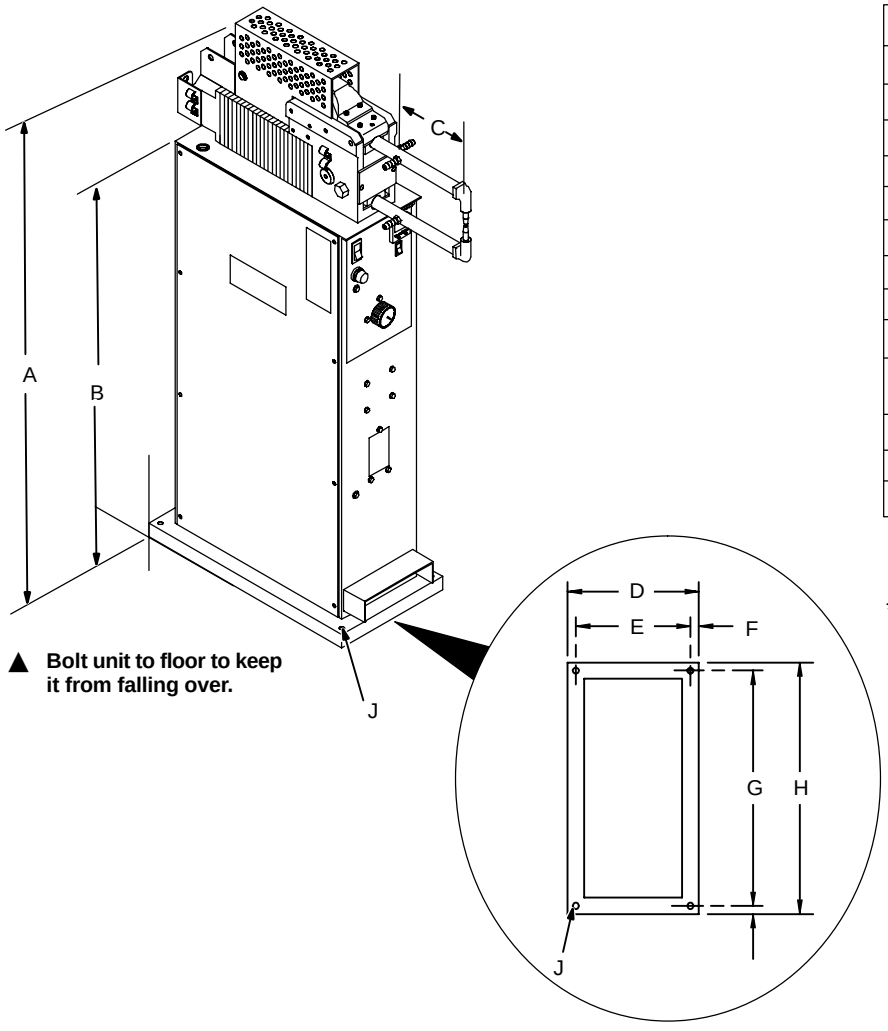
2-1. Specifications

ATT Models	Input Voltage 50/60 Hz AC 1-Phase	Input Amps	Work Capacity Combined Thickness Mild Steel	Rated Output At Listed Duty Cycle*	Rated Output Amperes At Listed Tong Length			Open-Circuit Voltage
					6 in (152 mm)	12 in (305 mm)	18 in (457 mm)	
PSW-1020	230	45	3/16 in (4.7 mm)	10 kVA 50%	9500	7500	6500	2.50
PSW-2020	230	90	1/4 in (6.3 mm)	20 kVA 40%	12,500	10,500	9000	3.55
SSW-1020	230	45	3/16 in (4.7 mm)	10 kVA 50%	9500	7500	6500	2.50
SSW-2020	230	90	1/4 in (6.3 mm)	20 kVA 40%	12,500	10,500	9000	3.55
SSW-2040	460	45	1/4 in (6.3 mm)	20 kVA 40%	12,500	10,500	9000	3.55

*Based on 10 second time period; means unit can weld for 5 seconds out of each 10 second time period.

2-2. Dimensions And Weight

A. For Stationary Models

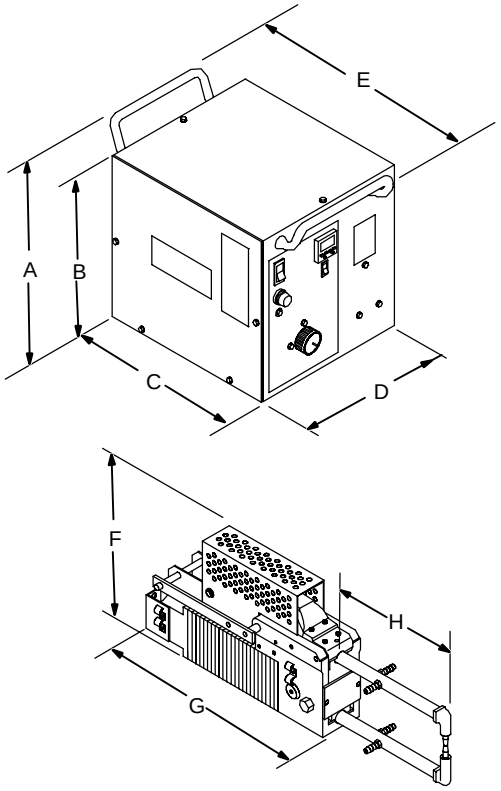


Dimensions	
A	49 in (1245 mm)
B	37-1/8 in (943 mm)
C	*
D	10-7/8 in (276 mm)
E	9-1/2 in (241 mm)
F	11/16 in (18 mm)
G	19-1/2 in (495 mm)
H	20-7/8 in (530 mm)
I	11/16 in (18 mm)
J	1/2 in (13 mm) Dia. 4 Holes
Weight	
SSW-1020	170 lb (77 kg)
SSW-2020, 2040	185 lb (84 kg)

*Dimension depends upon length of tongs. See Parts List for sizes.

Ref. 802 751

B. For Portable Models



Dimensions	
A	15-5/8 in (397 mm)
B	14-3/8 in (365 mm)
C	15-1/8 in (384 mm)
D	12-1/4 in (311 mm)
E	19 in (483 mm)
F	11-7/8 in (302 mm)
G	19-3/8 in (492 mm)
H	*
Weight	
PSW-1020	72 lb (33 kg)
PSW-2020	89 lb (40 kg)
Control Box	75 lb (34 kg)

*Dimension depends upon length of tongs. See Parts List for sizes.

Ref. 802 763 / Ref. 802 759

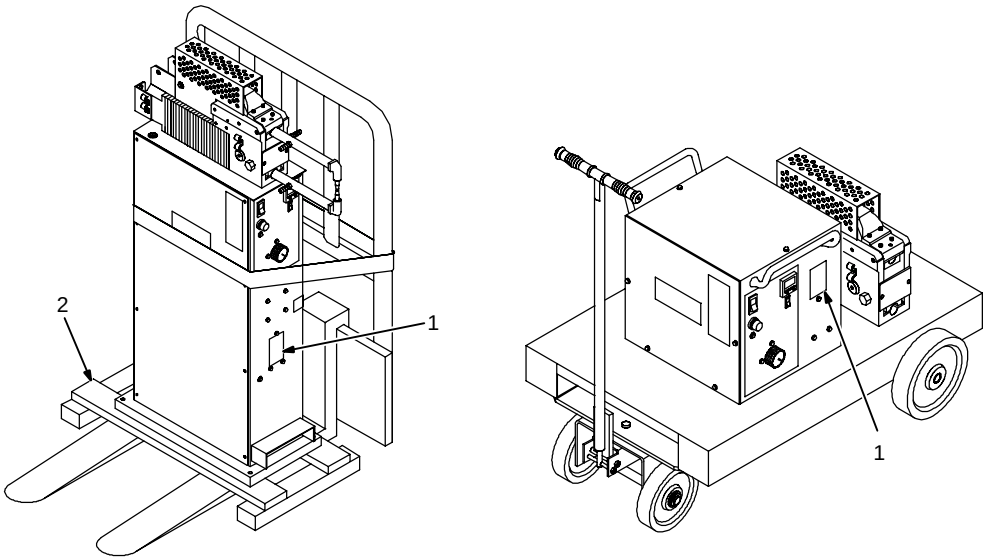
2-3. Moving The Spot Welder

1 Rating Label

Locate unit near correct input power supply.

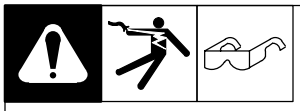
2 Skid

Place unit on skid and secure with straps.

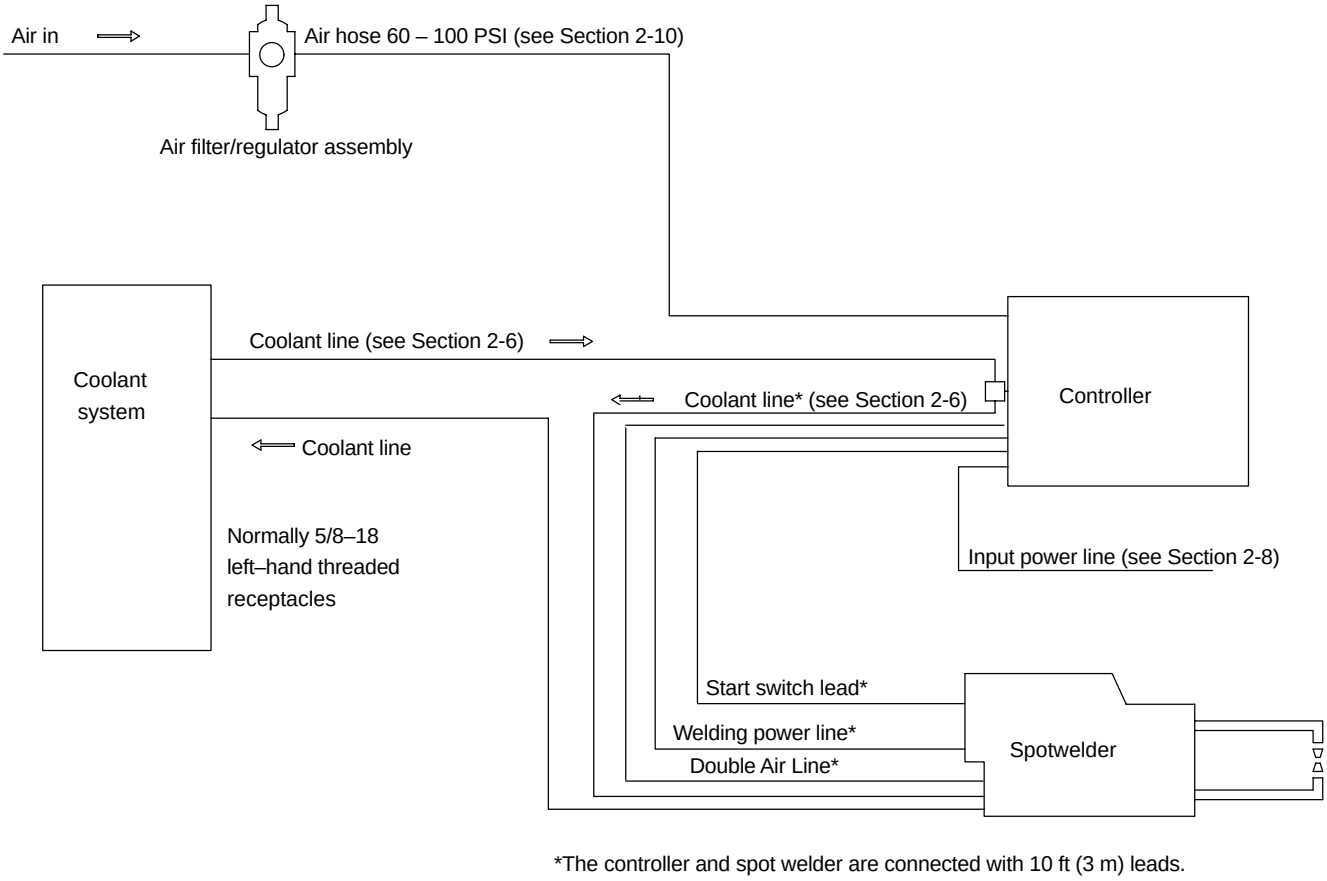


802 752 / 802 753

2-4. Overview Of System Connections

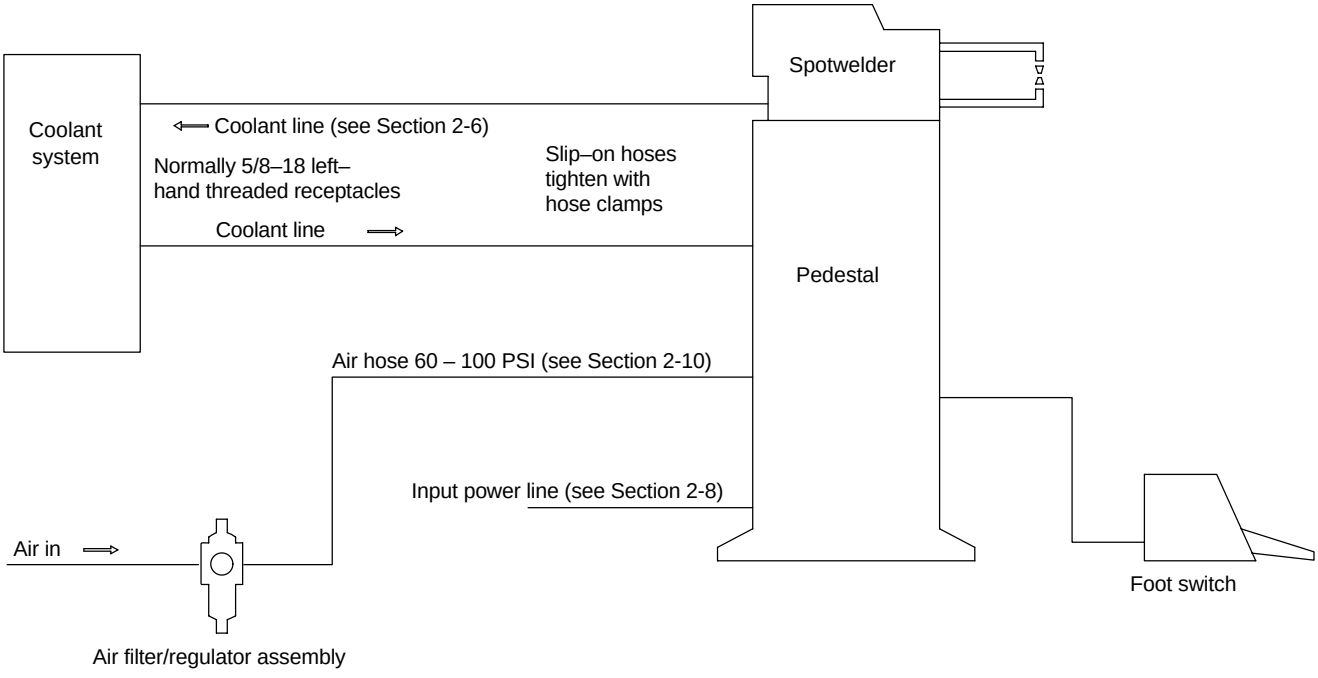


PSW Models



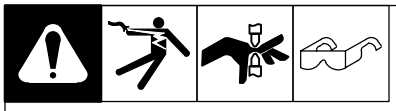
*The controller and spot welder are connected with 10 ft (3 m) leads.

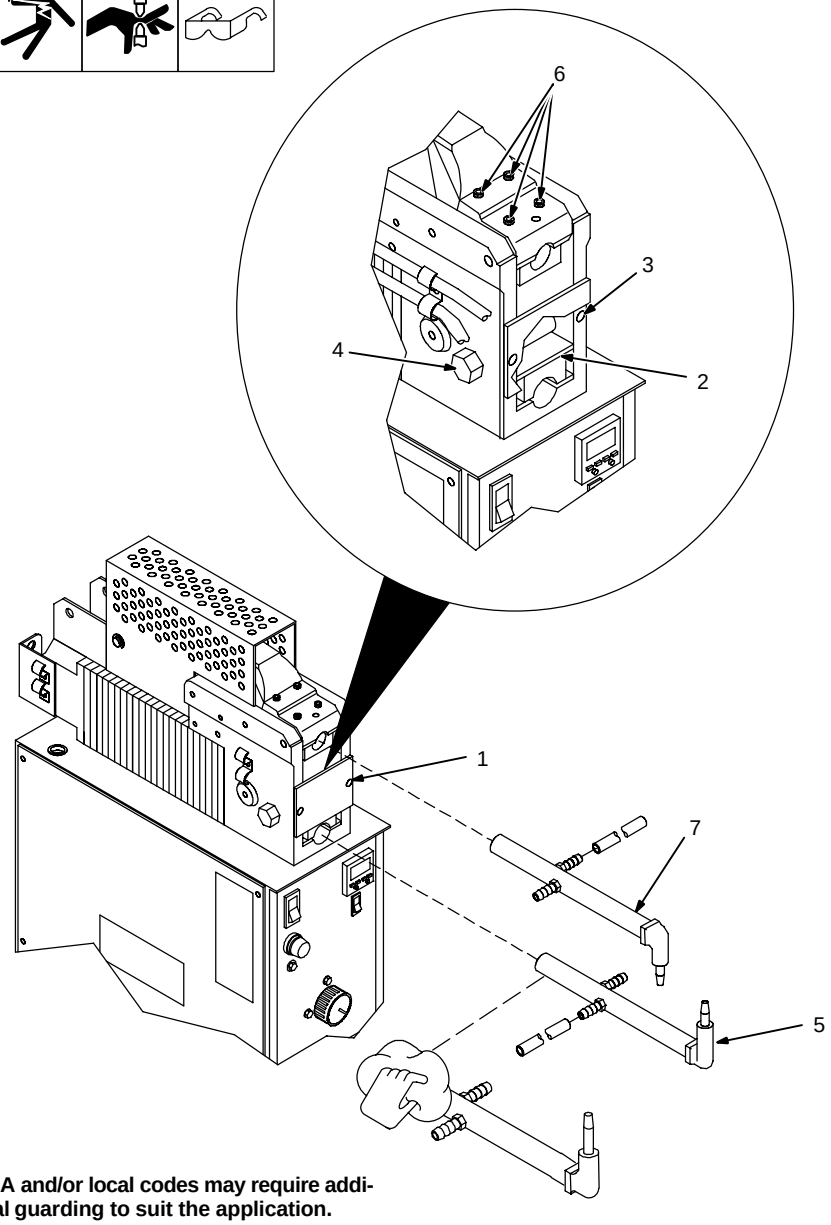
SSW Models



802 792-A

2-5. Installing Or Cleaning Tongs





▲ **OSHA and/or local codes may require additional guarding to suit the application.**

▲ **Turn off unit and disconnect input power.**

☞ *Be sure tong ends are clean and not corroded before installing. Clean tongs with fine steel wool.*

Bottom Tong Installation:

1 Spatter Guard

2 Insulating Strip

Check to see that insulating strip is not cracked.

▲ **Electric shock hazard and possible transformer damage from incorrect part. Do not replace polyester glass insulating strip with a metal strip – use only proper parts from Parts List.**

3 Setscrew

Loosen setscrew.

4 Cam Nut

Turn nut counterclockwise to release pressure on bottom tong.

5 Bottom Tong

Slide tong into bottom tong holder as far as possible, and position so that tip is pointing straight up.

Turn cam nut clockwise to secure tong in holder.

Tighten setscrew to lock cam in place.

Top Tong Installation:

6 Top Tong Securing Screws

Loosen the four screws.

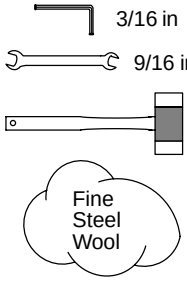
7 Top Tong

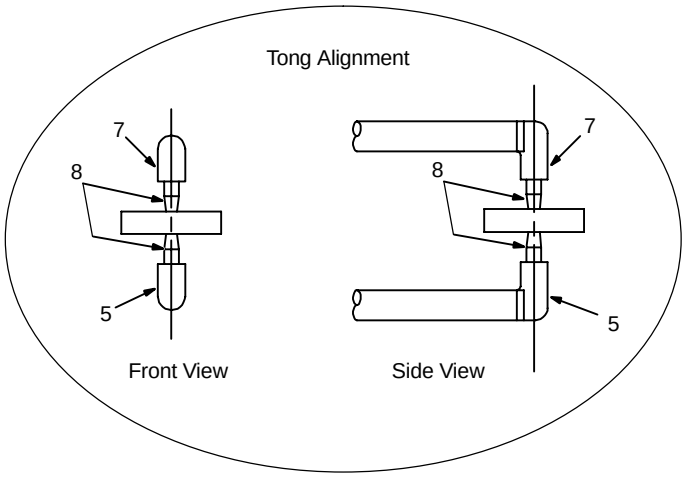
8 Tips

Slide tong into top tong holder as far as necessary, so that tip mates with bottom tip when tongs are closed.

Adjust tong positions to line up centers of tips as shown.

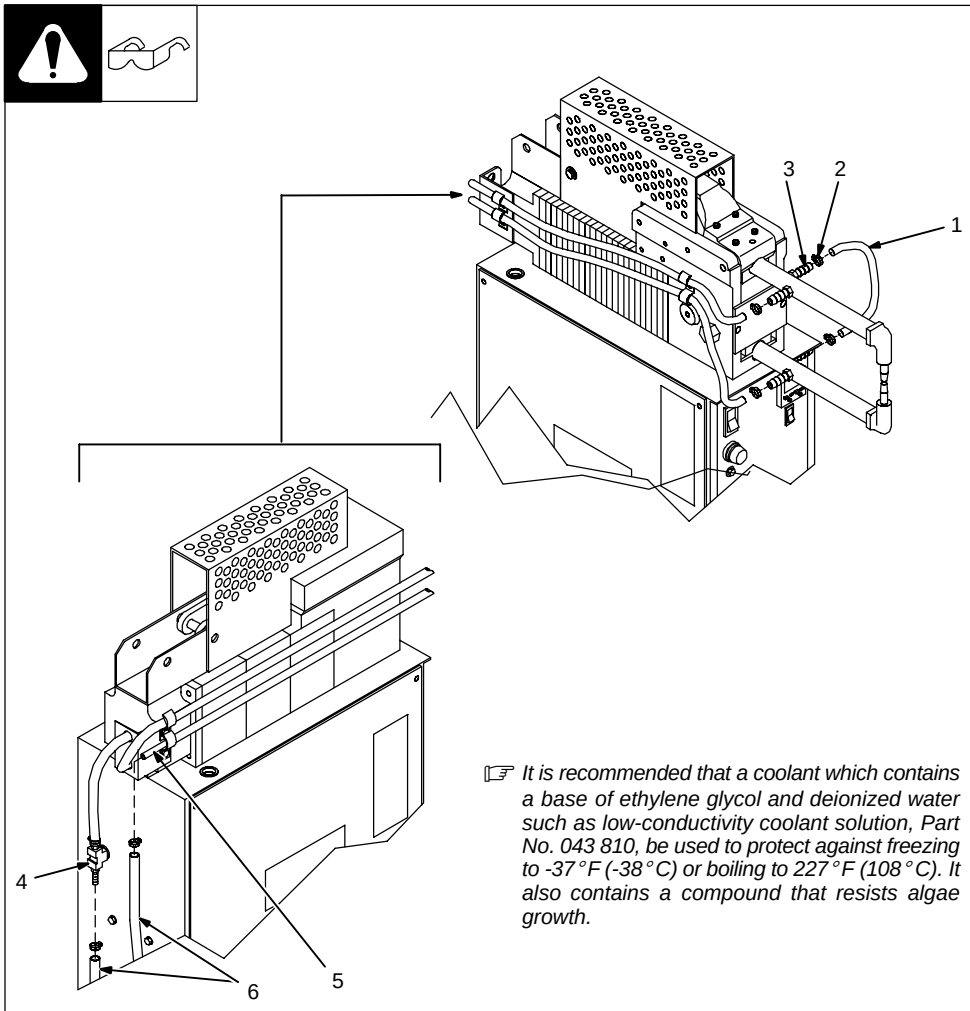
Tighten securing screws to lock tong in place.





802 754 / 801 436 / Ref. 800 154-A

2-6. Coolant Connections



☞ *It is recommended that a coolant which contains a base of ethylene glycol and deionized water such as low-conductivity coolant solution, Part No. 043 810, be used to protect against freezing to -37°F (-38°C) or boiling to 227°F (108°C). It also contains a compound that resists algae growth.*

▲ **Turn off power and coolant supply until installation is complete.**

1 Tong Coolant Hose

2 Hose Clamp

3 Barbed Fitting

4 Coolant-In Fitting

5 Coolant-Out Tube

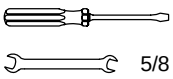
6 Coolant Hoses (Customer Supplied)

Install hoses as shown.

☞ *This unit is equipped with a water control pressure switch to insure proper cooling. If there is not enough pressure to close the switch, the unit will not weld. For proper operation, coolant supply must have a minimum pressure of 30 psi (207 kPa), a maximum temperature of 86° F (30° C), and a flow rate of 2.5 to 3 qt/min (2.4 to 2.8 L/min).*

Obtain two hoses of desired length with 5/16 in (7.9 mm) inside diameter.

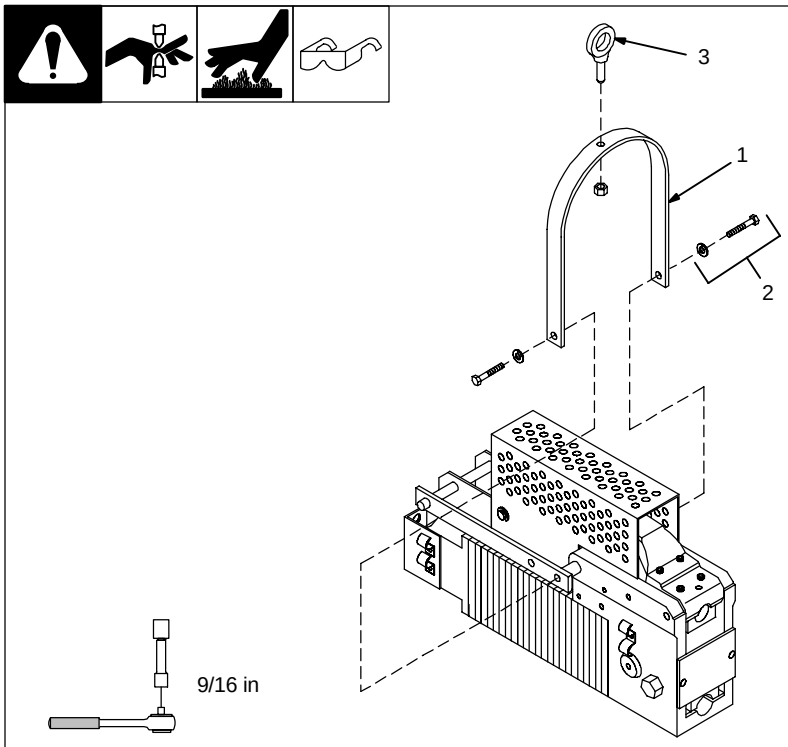
Connect hoses as shown, and secure with hose clamps.



5/8 in

Ref. 802 755 / Ref. 802 758

2-7. Hanging Bracket Installation (Portable Models Only)



▲ **Be sure cable or chain used to suspend unit is properly sized for the machine weight (see Section 2-2).**

1 Hanging Bracket

2 Mounting Hardware

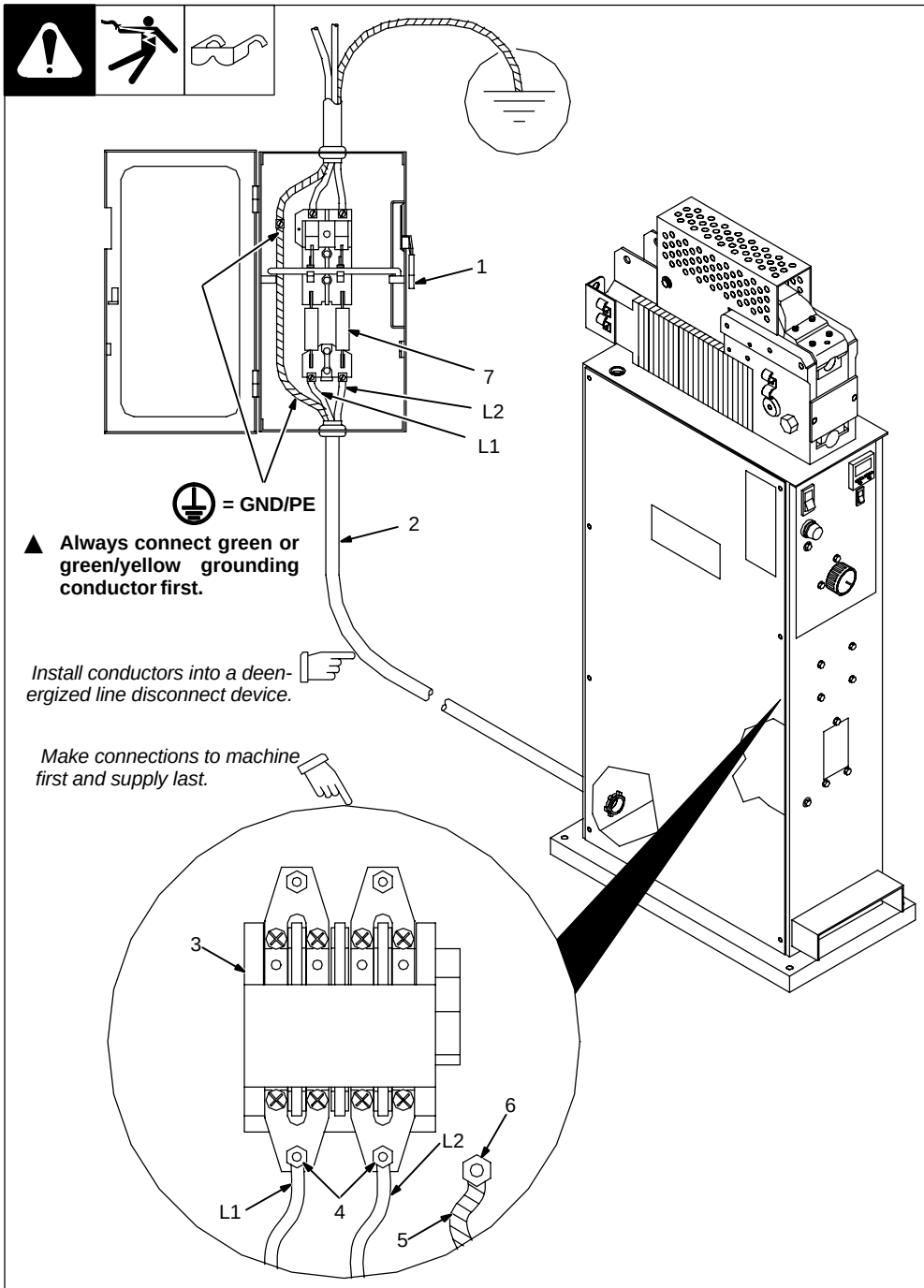
Remove and retain hardware from handle.

Install bracket and secure with existing hardware as shown.

3 Eye Bolt With Hardware

Ref. 802 759

2-8. Connecting Input Power



▲ **Disconnect and lockout/tagout input power before connecting input conductors from unit.**

Have only qualified persons make this installation.

Remove left side panel.

1 Line Disconnect Device

2 Input And Grounding Conductors

Select size and length using Section 2-9. Conductors must comply with national, state, and local electrical codes. If applicable, use lugs of proper amperage capacity and correct hole size.

▲ **Make input power connections to the machine before making connections into a deenergized line disconnect device. In the line disconnect device, always connect green or green/yellow grounding conductor to supply grounding terminal first, never to a line terminal.**

3 Contactor

4 Line Terminals

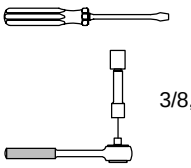
5 Grounding Conductor

6 Ground Terminal

Reinstall side panel.

7 Overcurrent Protection (Fuses Shown)

Select type and size using Section 2-9.



Ref. 802 760

2-9. Electrical Service Guide

	10 KVA Single Phase	20 KVA Single Phase	
Input Voltage	230	230	460
Input Amperes At Rated Output	45	90	45
Max Recommended Standard Fuse Rating In Amperes [1]			
Time-Delay [2]	50	110	50
Normal Operating [3]	70	125	70
Min Input Conductor Size In AWG/Kcmil	8	6	10
Max Recommended Input Conductor Length In Feet (Meters)	100 (30)	78 (24)	131 (40)
Min Grounding Conductor Size In AWG/Kcmil	8	6	10

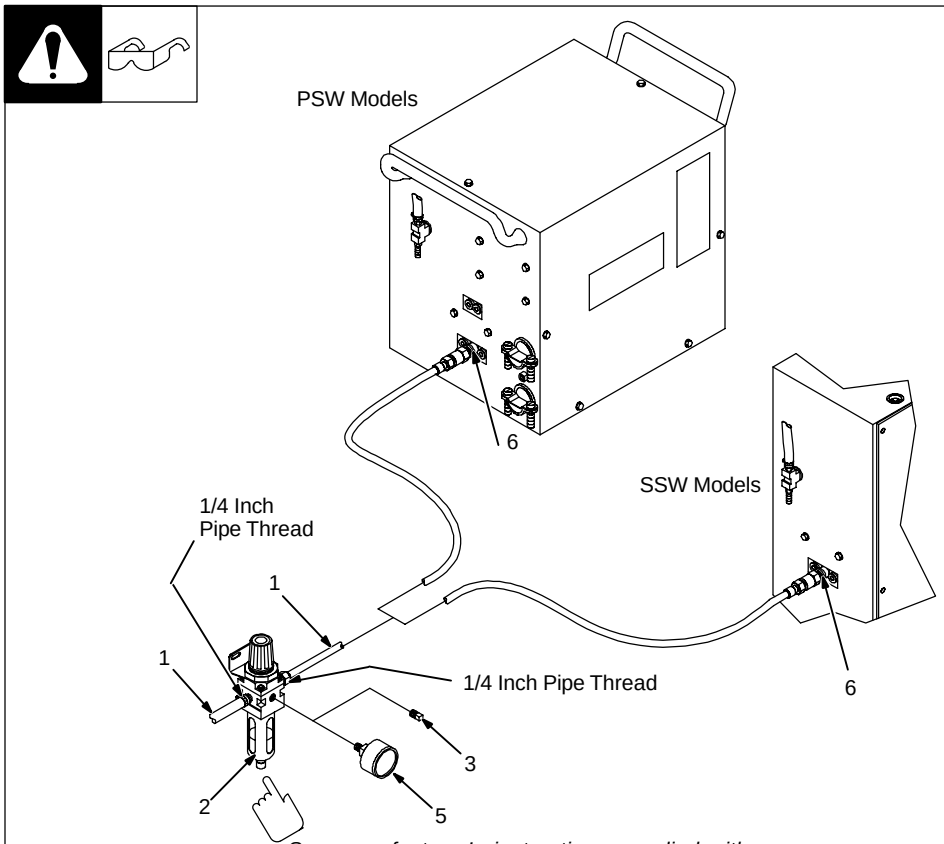
Reference: 1999 National Electrical Code (NEC)

1 Consult factory for circuit breaker applications.

2 “Time-Delay” fuses are UL class “RK5” .

3 “Normal Operating” (general purpose - no intentional delay) fuses are UL class “K5” (up to and including 60 amp), and UL class “H” (65 amp and above).

2-10. Air Connections



See manufacturer’s instructions supplied with filter/regulator (FR) assembly for complete installation and preparation instructions.

▲ **Turn off power and air supply until installation is complete.**

1 Air Hoses (Customer Supplied)

Obtain two hoses of correct size, type, and length. Air-In fittings on control boxes have 5/8-18 left-hand threads.

2 Air Filter

Connect one hose to air supply and other end to input fitting on the regulator.

3 Regulator Plug

4 Regulator

5 Pressure Gauge

Remove appropriate regulator plug and install pressure gauge.

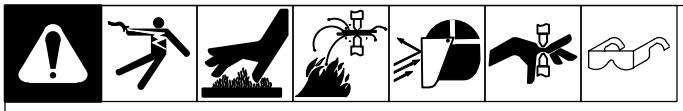
Set regulator so air pressure is in the 60 to 100 psi (414 to 689 kPa) range.

6 Air-In Fitting

Connect one end of remaining hose to regulator output fitting, and connect other end to Air-In fitting.

802 761-A

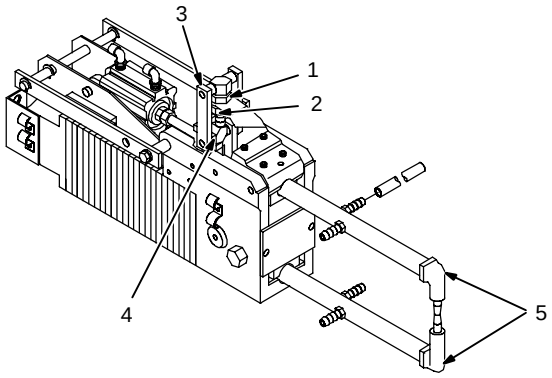
2-11. Adjusting Tong Pressure



▲ **Turn off power before making adjustments.**

13/16 in

1 Top Nut
2 Bottom Nut
3 Top Linkage
4 Bottom Linkage
5 Tongs



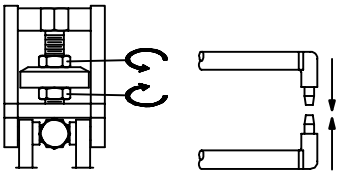
☞ *Tong pressure must be checked and/or set before operation. Correct tong pressure is necessary to create a quality weld and to prevent damage to tips.*

Too much tong pressure causes the weld nugget to dimple and material to splash out around the nugget area.

If tong pressure is too weak, parts are loose when the tongs are closed, severe arcing occurs between workpieces, and no weld can be made.

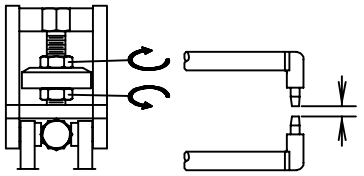
Air Supply On

Step 1



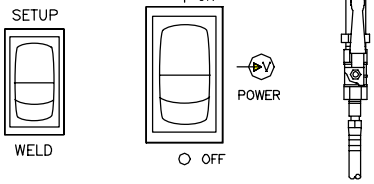
Loosen both nuts and push tong tips together.

Step 2



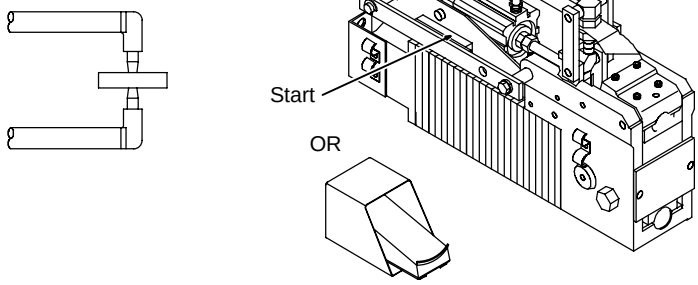
Begin to tighten top nut. This causes tong tips to open. Stop when opening is a little less than thickness of material to be welded. Tighten bottom nut.

Step 3



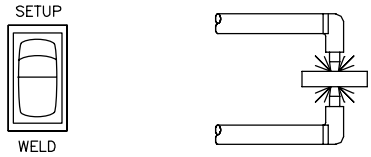
Set controls.

Step 4



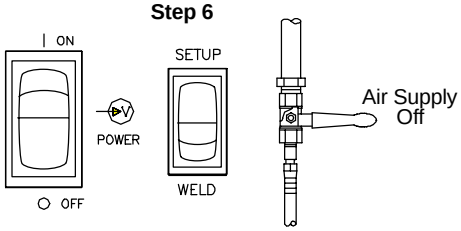
Place material to be welded between tong tips, and press start switch or remote foot control (see Section 3-1).

Step 5



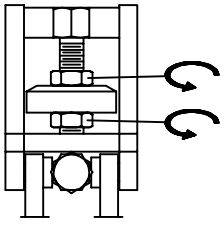
If tong pressure appears correct, place Weld switch in Weld position and try a sample weld according to Section 3-1.

Step 6



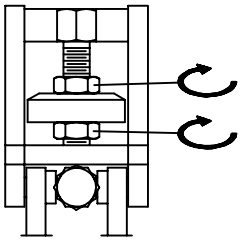
Set controls. If tong pressure is correct, stop here. If further adjustment is required, go to next step.

Step 7



To **INCREASE** tong pressure, loosen top nut 1/4 turn. Tighten bottom nut, turn air and Power On, and go to Step 4.

Step 8

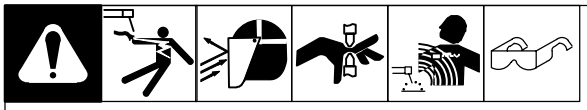


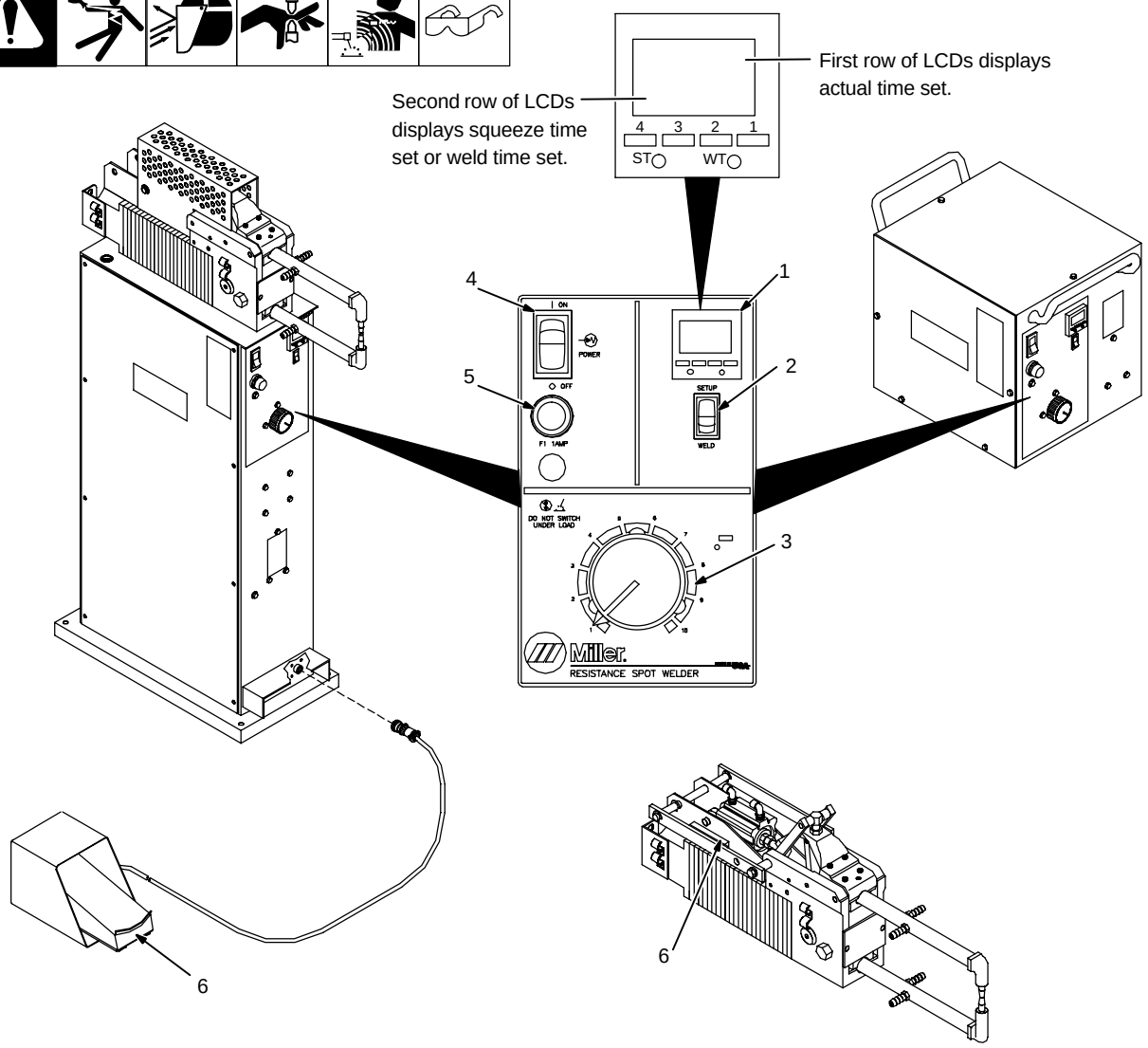
To **DECREASE** tong pressure, loosen bottom nut 1/4 turn. Tighten top nut, turn air and Power On, and go to Step 4.

Ref. 802 762 / Ref. 161 768-B

SECTION 3 – OPERATION

3-1. Controls





802 751 / Ref. 802 763 / 802 762 / 200 264-A

1 Time Control

Squeeze Time (ST) - Use control to set enough time for tongs to close and apply full pressure to the work before weld amperage starts. Push ST button, then use buttons 3, 2, 1 to select squeeze time from 0 to 9.99 seconds. Squeeze time begins when the Remote Foot Switch or Start Switch is pressed.

Weld Time (WT) - Push WT button, then use buttons 3, 2, 1 to select spot weld time from 0 to 9.99 seconds.

Weld time begins at the end of the squeeze time cycle.

2 Weld Switch

Use control to check tong pressure and alignment without weld amperage present at the tongs. When the switch is in the Set Up position, pressing the Remote Foot Switch or Start Switch closes the tongs without starting weld amperage. When the switch is in the Weld position, tongs have weld amperage present after the squeeze time has ended.

3 Weld Amperage Control

Turn clockwise to increase current. Changing the weld current value does not affect the duty cycle rating. The scale is for reference only.

4 Power/Pilot Light/Circuit Breaker Switch

Use switch to turn On power and pilot light. See Section 4-2 for circuit breaker operation.

5 Fuse F1

See Section 4-2.

6 Start Switch/Remote Foot Switch

Use Start Switch (Portable Models)/Remote Foot Switch (Stationary Models) to close tongs and start squeeze time.

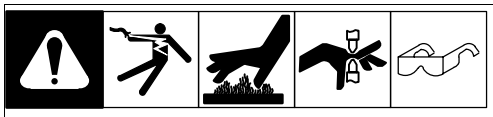
If switch is released before squeeze time ends, the tongs open, and the unit resets for another weld cycle.

If switch is held until squeeze time ends and weld time starts, the switch may be released, and the tongs will stay closed until weld time ends.

If workpiece is to be left between tongs after weld time ends, switch must be held for whatever hold time is desired after welding ends.

SECTION 4 – MAINTENANCE AND TROUBLESHOOTING

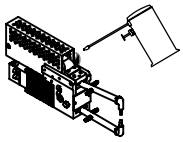
4-1. Maintenance



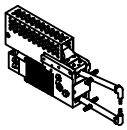
▲ **Disconnect power before maintaining.**

☞ *During heavy service, maintain monthly.*

3 Months



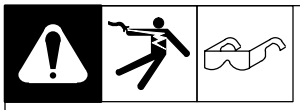
Oil Unit



Inspect Tips

Replace Damaged Or Unreadable Labels

4-2. Overload Protection



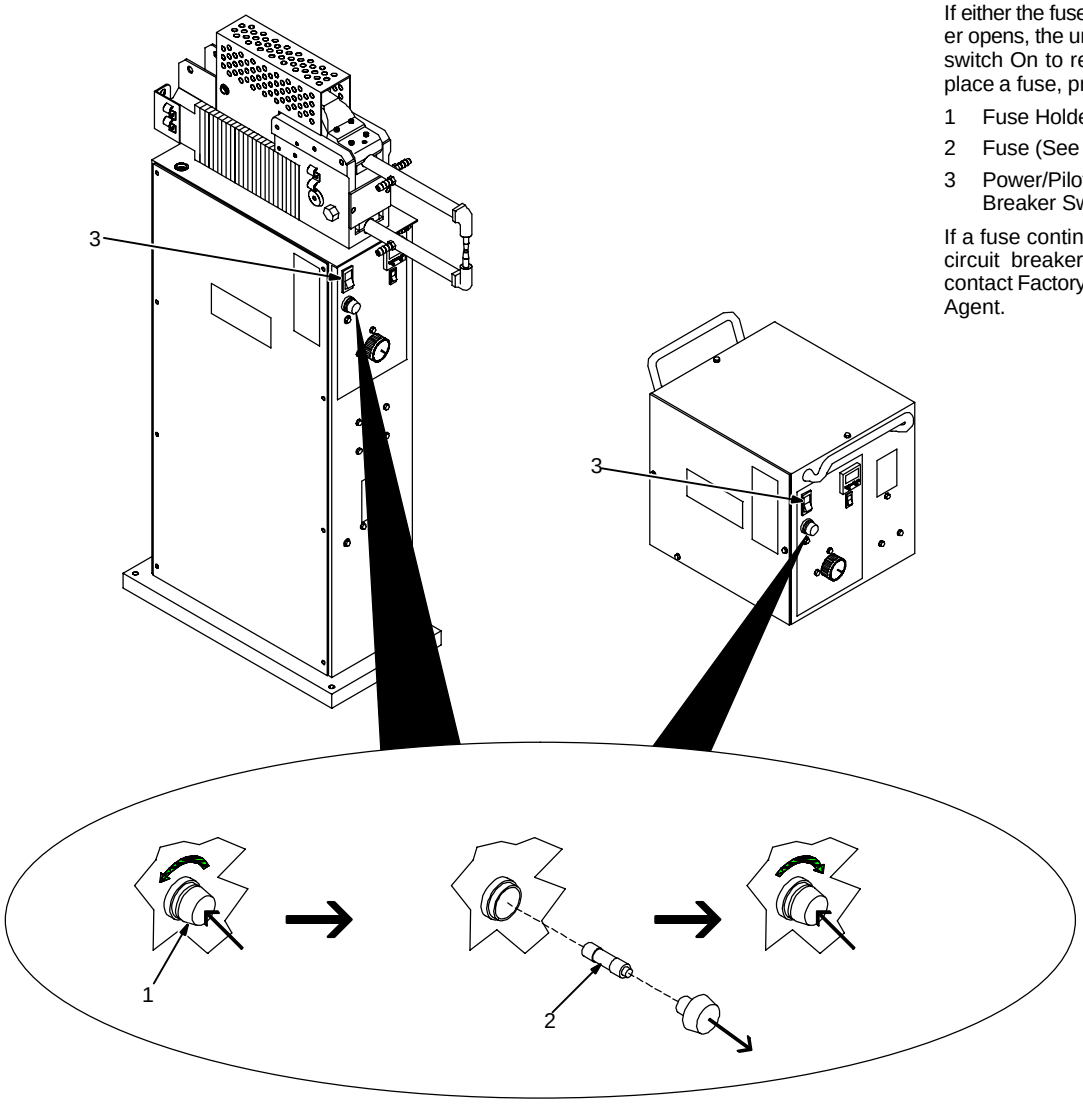
▲ **Turn Off power before checking fuse.**

Fuse F1 and Power/pilot light/circuit breaker switch S1 protect the control circuitry.

If either the fuse or the circuit breaker opens, the unit shuts down. Turn switch On to reset breaker. To replace a fuse, proceed as shown:

1 Fuse Holder Cover
2 Fuse (See Parts List)
3 Power/Pilot Light /Circuit Breaker Switch

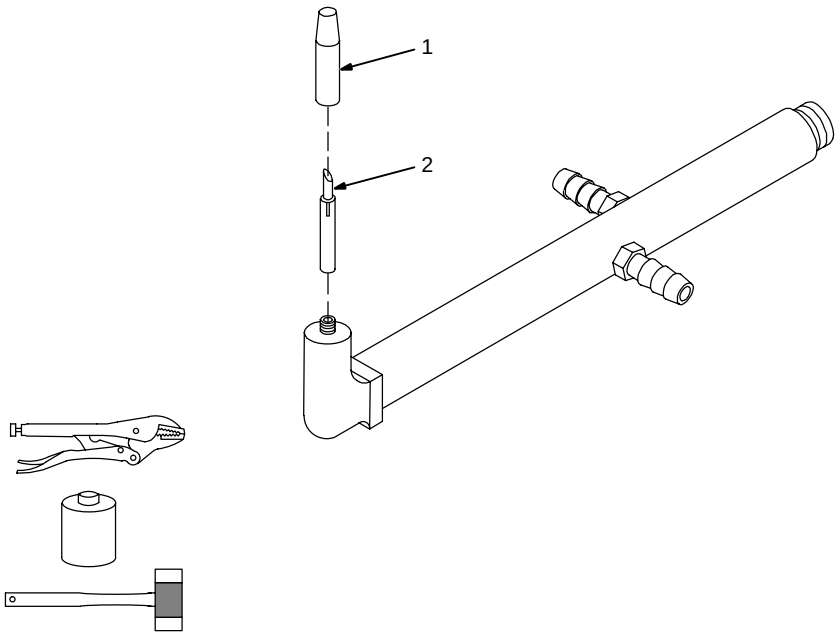
If a fuse continues to open, or the circuit breaker continues to trip, contact Factory Authorized Service Agent.



802 763

4-3. Installing Or Dressing Tips

A. Installing Tips



▲ **Turn off power before removing tips.**

1 Tip

2 Telescoping Tube

Removal:

Tips have a Morse Taper and a press fit.

☞ *Use a vice grip pliers to rotate and loosen tips. Once loose, pull tips straight out.*

▲ **Do not move tips from side to side when removing or telescoping tube will snap off.**

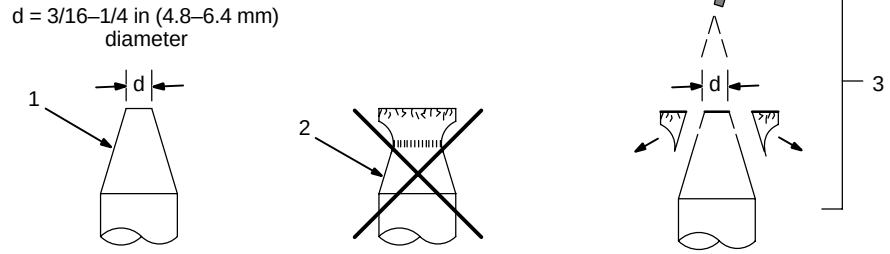
Installation:

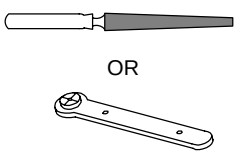
Coat taper area of tip with pipe sealant compound. Pull telescoping tube all the way up, but not out. Use a plastic or leather hammer to tap tip into seat. Run water through tong to check for leaks.

Repeat if necessary.

ST-801 437

B. Dressing Tips



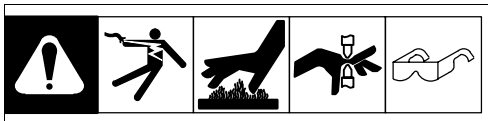


1 New Tip

2 Used Tip Requiring Dressing

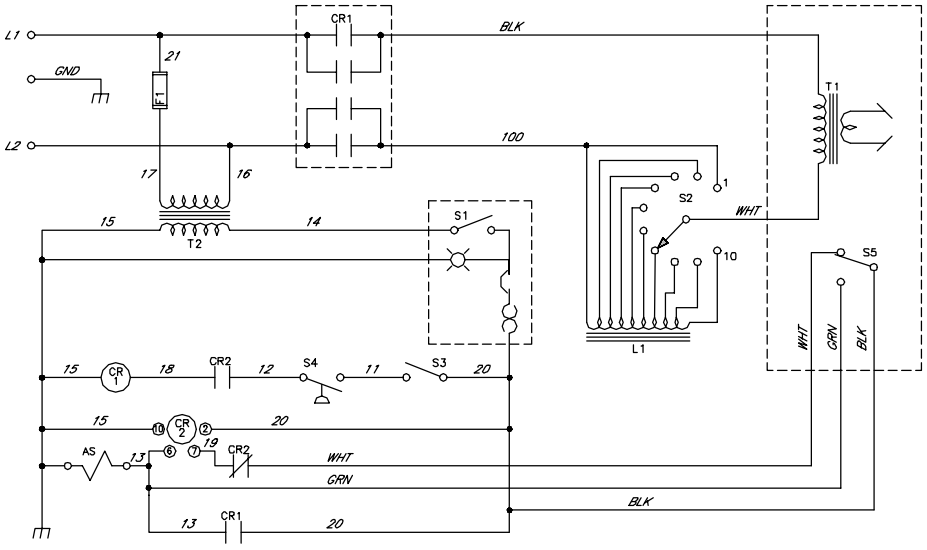
3 Dressing Method – Keep top diameter same as a new tip.

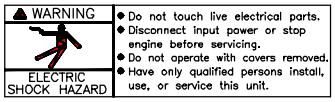
4-4. Troubleshooting



Trouble	Remedy
No weld output; pilot light Off.	Check line fuses, and replace if necessary (see Section 2-8).
	Check fuse F1 and/or Power/pilot light/circuit breaker switch S1, and replace if necessary (see Section 4-2).
	Turn On Power/pilot light/circuit breaker switch S1.
No weld output, pilot light on.	Check for proper coolant supply pressure (see Section 2-6).
	Place Weld Switch S3 in the Weld position (see Section 3-1).
	Have Factory Authorized Service Agent check contactor W.
Low weld output; pilot light On.	Dress or replace tips (see Section 4-3).
	Remove and clean ends of tongs and tong holders (see Section 2-5).
	Adjust tong pressure (see Section 2-11).
Longer than normal Weld Time required.	Dress or replace tong tips (see Section 4-3).
	Clean workpieces.
	Adjust tong pressure (see Section 2-11).
	Check input line voltage.
Burn through at point of weld.	Shorten weld time (see Section 3-1).
	Adjust tong pressure (see Section 2-11).
	Dress or replace tong tips (see Section 4-3).
	Realign tips (see Section 2-5).
Tongs close too slowly.	Check air pressure at source and at regulator (see Section 2-10).
	Have Factory Authorized Service Agent check and replace air valve, if necessary.

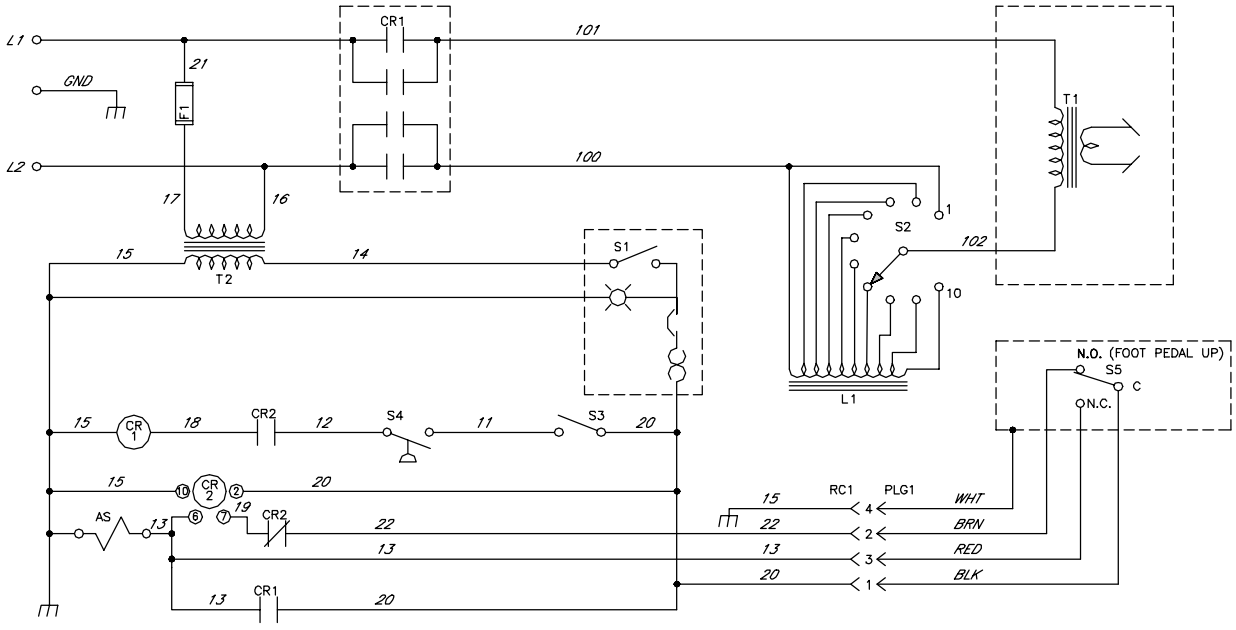
SECTION 5 – ELECTRICAL DIAGRAMS

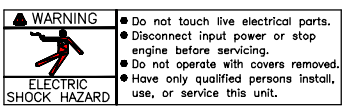



WARNING
Do not touch live electrical parts.
Disconnect input power or stop engine before servicing.
Do not operate with covers removed.
Have only qualified persons install, use, or service this unit.
ELECTRIC SHOCK HAZARD

199 203

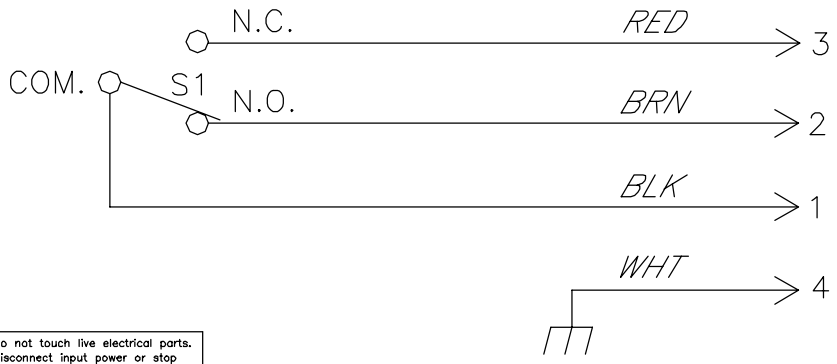
Figure 5-1. Circuit Diagram For Portable Models

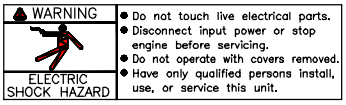



WARNING
Do not touch live electrical parts.
Disconnect input power or stop engine before servicing.
Do not operate with covers removed.
Have only qualified persons install, use, or service this unit.
ELECTRIC SHOCK HAZARD

199 202

Figure 5-2. Circuit Diagram For Stationary Models




WARNING
Do not touch live electrical parts.
Disconnect input power or stop engine before servicing.
Do not operate with covers removed.
Have only qualified persons install, use, or service this unit.
ELECTRIC SHOCK HAZARD

200 302-A

Figure 5-3. Circuit Diagram For Foot Control

SECTION 6 – PARTS LIST

☞ *Hardware is common and not available unless listed.*

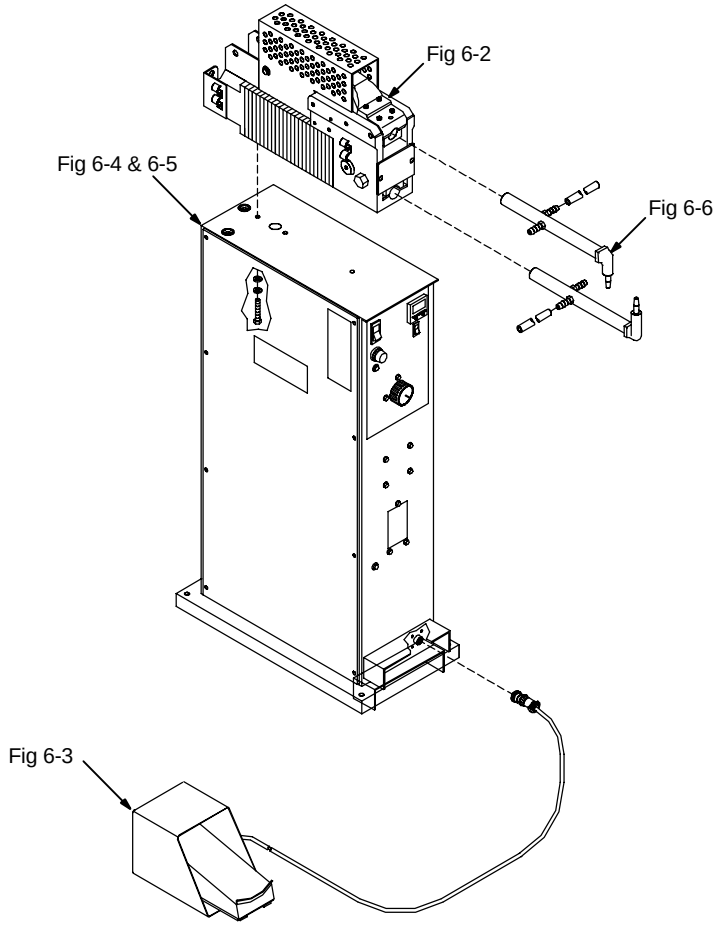
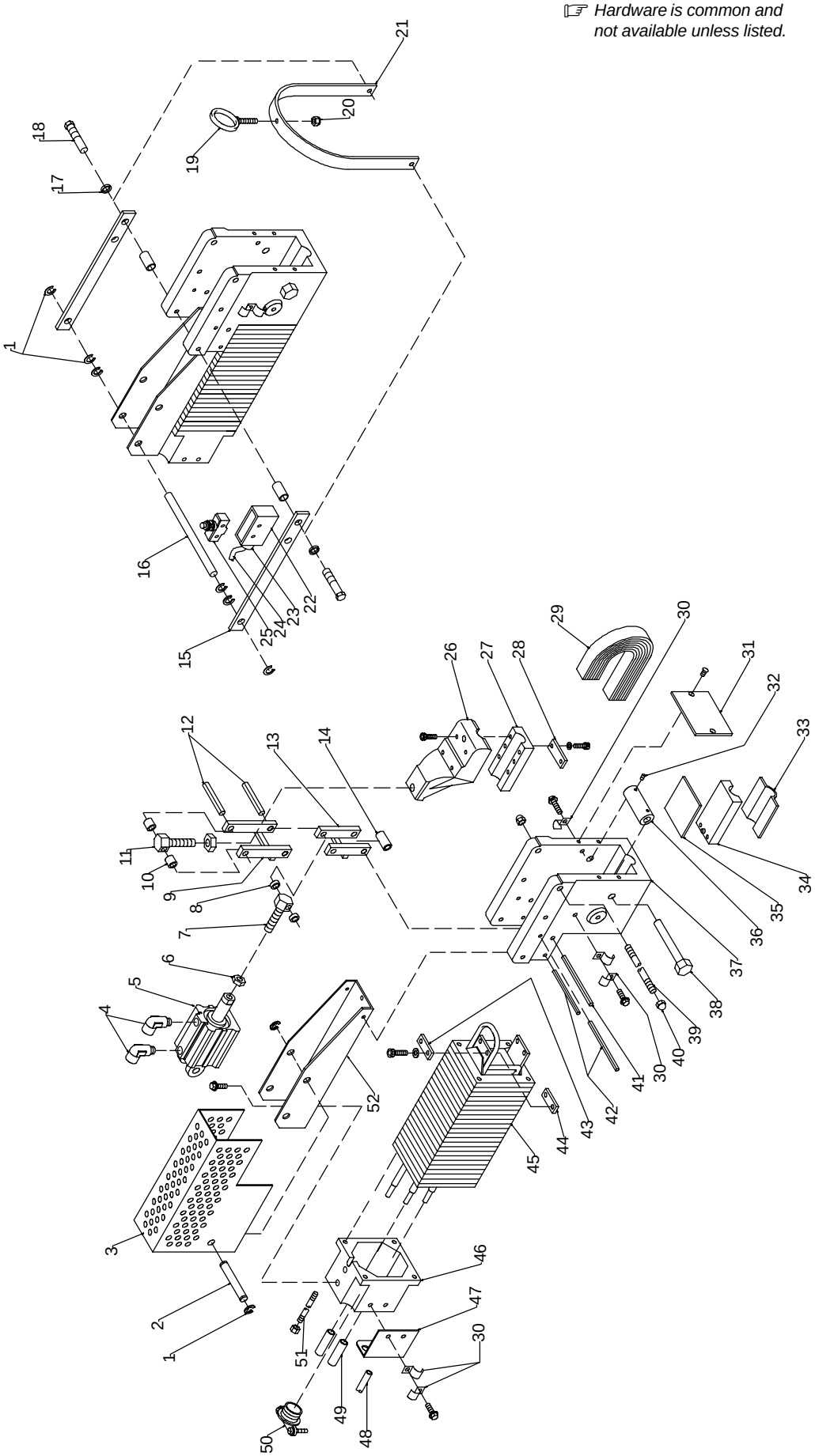


Figure 6-1. Main Assembly

Part No.	Description	Quantity Model PSW- 1020 ATT 2020ATT	Quantity Model SSW- 1020ATT	Quantity Model SSW- 2020ATT 2040ATT
	Figure 6-1. Main Assembly			
.. 209 661	... FILTER/REGULATOR	1	1	1
... Fig 6-2	... RESISTANCE SPOT WELDER, air	1	1	1
... Fig 6-4	... PEDESTAL, air operated	1	1	1
... Fig 6-5	... CONTROL BOX	1		
... Fig 6-3	... RFSW-10/20	1	1	1
... Fig 6-6	... TONGS, (Optional)	1	1	1
.. 603 105	... HOSE, nprn brd No. 1 x .312 ID (order by ft)	7ft	7ft	7ft
.. 600 313	... CABLE, pwr No. 6ga 3/c (order by ft)	13ft		
.. 007 826	... CABLE, port No. 18 3/c (order by ft)	13.5ft		
.. 110 522	... HOSE, air rear (consisting of)	1		
.. 110 521	... HOSE, air front (consisting of)	1		
.. 059 202	..... FITTING, hose brs barbed nipple 5/16tbg	2		
.. 010 607	..... FITTING, hose brs nut .625-18 LH	2		
.. 057 173	..... FITTING, hose brs ferrule .550 ID x .718 lg	2		
.. 603 105	..... HOSE, nprn brd No. 1 x .312 ID (front) (order by ft)	12ft		
.. 603 105	..... HOSE, nprn brd No. 1 x .312 ID (rear) (order by ft)	11ft		
.. 010 323	... CLAMP, hose .250 -.625clp dia	8	8	8

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

☞ *Hardware is common and not available unless listed.*



802 774

Figure 6-2. Resistance Spot Welder, Air

Item No.	Dia. Mkgs.	Part No.	Description	Quantity Model PSW- 1020ATT	PSW- 2020ATT	SSW- 1020ATT	SSW- 2020ATT 2040ATT
			Figure 6-2. Resistance Spot Welder, Air (Fig 6-1)				
. 1		000 365	RING, rtng ext .390 shaft grv x .042 E	6	6	2	2
. 2		110 524	PIN, cylinder air	1	1	1	1
. 3		198 639	GUARD, spot welder	1	1	1	1
. 4		199 115	FITTING, pipe brs	2	2	2	2
. 5		199 104	CYLINDER, air	1	1	1	1
. 6		601 881	NUT, stl hex jam .500-20	3	3	3	3
. 7		010 749	SCREW, .500-20 x 1.562hexhd stl	1	1	1	1
. 8		010 748	TUBING, stl .625 OD x 12ga wall x .203	2	2	2	2
. 9		010 746	LINKAGE, upper	1	1	1	1
10		010 736	TUBING, stl .625 OD x 12ga wall x .203	2	2	2	2
. 11		010 726	SCREW, adj pressure	1	1	1	1
12		010 720	PIN, spring CS .375 x 2.750	2	2	2	2
13		010 747	LINKAGE, lower	1	1	1	1
14		010 738	TUBING, stl .625 OD x 12ga wall x 1.187	3	3	1	1
15		110 560	HANDLE	2	2		
16		110 557	PIN, handle	1	1		
17		602 213	WASHER, lock stl split .375	2	2		
18		605 209	SCREW, hexhd stl .375-16 x 2.250	2	2		
19		110 510	BOLT, eye shld .375-16 x 1.250	1	1		
20		605 181	NUT, stl slflkg .375-16	1	1		
21		+110 561	BRACKET, hanging	1	1		
		109 480	LABEL, warning falling equipment etc	1	1		
22		202 227	BOX, switch	1	1	1	1
23		202 228	BUSHING	1	1	1	1
24		202 215	SWITCH, LIM 15 amp 125V plunger actr	1	1	1	1
25		007 826	CABLE	1	1	1	1
26		017 671	HOLDER, tong top	1	1	1	1
27		010 723	CLAMP, tong top	1	1	1	1
28		010 744	BAR, clamping	1	1	1	1
29		010 724	BRAID SET, tong	1	1	1	1
30		601 117	CLIP, jiffy .500	5	5	5	5
31		110 534	SPLATTER BOARD	1	1	1	1
32		112 480	SCREW, set .250-28 x .375 cup pt sch stl	3	3	2	2
33		110 530	INSULATION, tong bottom	1	1	1	1
34		110 529	CLAMP, tong bottom	1	1	1	1
35		110 533	STRIP, polyest gl .125 x 2.750 x 3.312	1	1	1	1
36		110 536	CAM, tong	1	1	1	1
37		110 903	HOUSING, front transformer	1	1	1	1
38		110 535	CAM, pin tong	1	1	1	1
39		010 719	STUD, stl .375-24 x 5.000	1	1	1	1
40		601 854	NUT, stl acorn .375-24 high crown	2	2	2	2
41		602 317	PIN, spring .375 x 4.000	1	1	1	1
42		110 898	PIN, spring .250 x 4.000	1	1	2	2
43		110 531	BAR, tong braid clamping	1	1	1	1
44		110 532	BAR, tong braid clamping	1	1	1	1
45	T1	121 317	TRANSFORMER, power main (230V)	1		1	
45	T1	121 319	TRANSFORMER, power main (230V)		1		1
45	T1	121 320	TRANSFORMER, power main (460V)				1
46		112 664	CAP, transformer rear	1	1		
46		110 527	CAP, transformer rear			1	1
		000 527	BLANK, snap-in .875mtg hole	1	1		

Item No.	Dia. Mkgs.	Part No.	Description	Quantity Model PSW- 1020ATT	PSW- 2020ATT	SSW- 1020ATT	SSW- 2020ATT 2040ATT
			Figure 6-2. Resistance Spot Welder, Air (Fig 6-1) (Continued)				
47		010 739	SHIELD, tube coolant	1	1	1	1
48		110 901	TUBING, coolant secondary	1	1	1	1
49		026 834	TUBING, fbr vulc .312 ID x .437 OD	2	2	2	2
50		604 102	CONNECTOR, clamp cable 1.000	1	1		
51		010 033	STUD, stl .250-28 x 7.750	4		4	
51		010 034	STUD, .250-28 x 11.000		4		4
52		110 539	BRACKET, mtg cylinder air	1	1	1	1

+When ordering a component originally displaying a precautionary label, the label should also be ordered.
To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

Item No.	Dia. Mkgs.	Part No.	Description	Quantity

Figure 6-3. RFSW-10/20 (Fig 6-1)

. 1		185 929	PEDAL/HOUSING/BOTTOM PLATE	1
. 2	S1	183 629	SWITCH, limit 10A 125/250V	1
. 3		200 288	CABLE, control (consisting of)	1
. 4		605 156	CABLE, port 20ga 5/c (order by ft)	6ft
. 5	PLG1	079 878	HOUSING PLUG & PINS (service kit)	1
. 6		187 078	COVER, guard	1
. 7		182 626	SPRING, ext	1

☞ *Hardware is common and not available unless listed.*

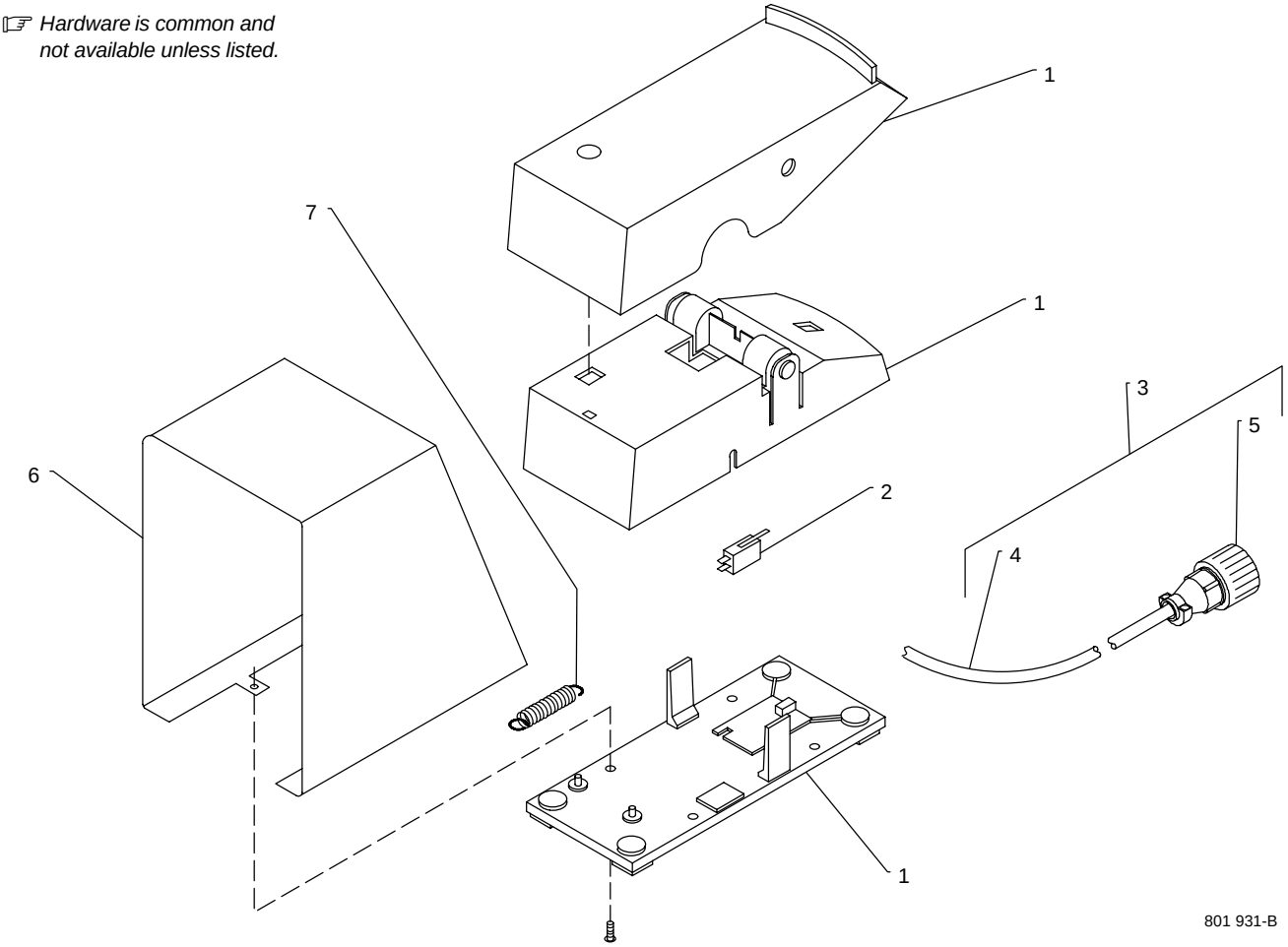


Figure 6-3. RFSW-10/20

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

☞ *Hardware is common and not available unless listed.*

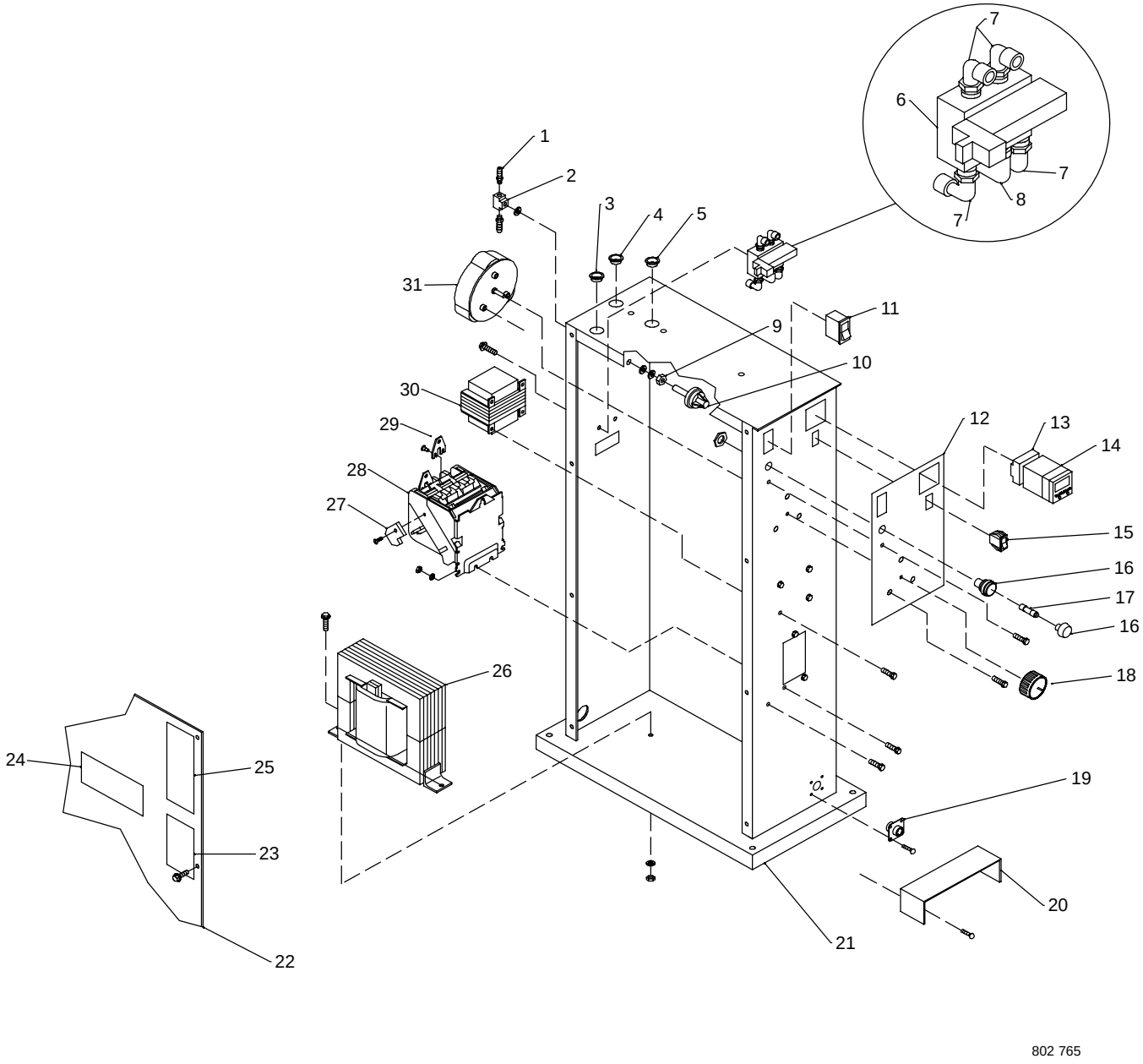


Figure 6-4. Pedestal, Air Operated (SSW Models)

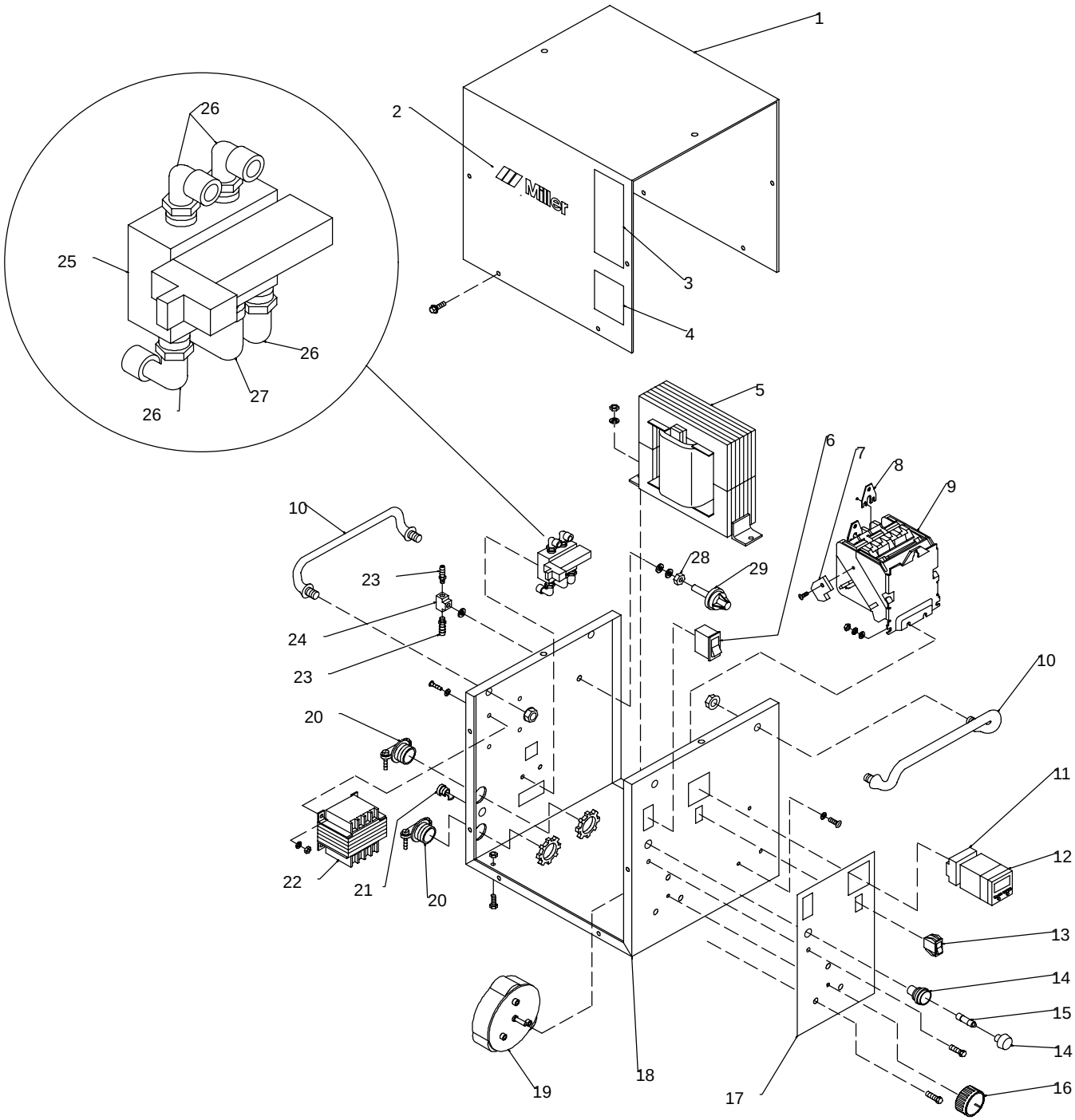
Item No.	Dia. Mkgs.	Part No.	Description	Quantity Model SSW-1020ATT	Quantity Model SSW-2020ATT 2040ATT
			Figure 6-4. Pedestal, Air Operated (Fig 6-1)		
1		053 525	FITTING, brs barbed M 5/16tbg x 1/8NPT	2	2
		603 105	HOSE, nprn brd No. 1 x .312 ID (order by ft)	2ft	2ft
		010 323	CLAMP, hose .250-.625dia	2	2
2		602 965	FITTING, pipe brs tee 1/8NPT	1	1
3		030 170	BUSHING, snap-in nyl .750 ID x 1.000mtg hole	2	2
4		070 371	BLANK, snap-in nyl 1.093 x 1.125mtg hole	1	1
5		057 357	BUSHING, snap-in nyl .937 ID x 1.125mtg hole	1	1
6	AS1	199 109	VALVE, 115 VAC 2way (5)1/4 nptf piping ports (consisting of)	1	1
7		199 115	FTG, pipe brs qcon elbow male 1/4 npt	3	3
8		010 678	FTG, pipe brs elbow st 1/4 NPTL	1	1
9		602 243	WASHER, flat stl .375	1	1
		605 787	WASHER, lock stl intl tooth .500	1	1
		010 910	WASHER, flat stl SAE .375	1	1
10	S5	177 123	SWITCH, pressure oil 4psi NO cont	1	1
11	S1	198 637	CIRCUIT BREAKER/SWITCH 1 amp lighted 120VAC	1	1
12		200 264	NAMEPLATE	1	1
13		199 247	SOCKET, relay 11 pin scr term	1	1
14	TD1	198 636	TIMER, digital al 0-9.99 sec 120 VAC 60 Hz cycle timer	1	1
15	S3	196 575	SWITCH, rocker SPST 10A 250VAC on-none-off .250 qc	1	1
16		044 747	HOLDER, fuse crtg 30A 600V	1	1
17	F1	*128 430	FUSE, crtg 1A 600V	1	1
18		097 926	KNOB, pointer	1	1
19	RC1	048 282	RECEPTACLE w/skts (service kit)	1	1
20		202 219	GUARD	1	1
21		198 635	CABINET, pedestal	1	1
22		+110 551	PANEL, side pedestal	1	1
23		201 063	LABEL, warning electric shock can kill, install	1	1
24		193 776	LABEL, MILLER 6.093 x 2.593 horizontal	1	1
25		143 140	LABEL, warning general precautionary	1	1
26	Z	199 200	REACTOR, (230V)	1	1
26	Z	199 201	REACTOR, (460V)	1	1
27	W1	048 731	INTERLOCK, cntor NO	1	1
28	W	034 909	CONTACTOR, 4P 115/230V (consisting of)	1	1
		034 910	COIL	1	1
		*034 911	KIT, point	4	4
29		035 049	LINK, connecting contactor term	4	4
30	T2	202 208	TRANSFORMER, control 100VA 230/460V	1	1
31	S2	011 632	SWITCH, rotary 10 pos 50A 300V	1	1

*Recommended Spare Parts.

+When ordering a component originally displaying a precautionary label, the label should also be ordered.

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

☞ *Hardware is common and not available unless listed.*



802 773

Figure 6-5. Control Box

Item No.	Dia. Mkgs.	Part No.	Description	Quantity Model PSW 2020ATT

Figure 6-5. Control Box (Fig 6-1)

1		+199 875	CASE SECTION, top and sides	1
2		193 776	LABEL, MILLER 6.093 x 2.593 horizontal	1
3		143 140	LABEL, warning general precautionary	1
4		201 063	LABEL, warning electric shock can kill, install	1
5	Z	110 897	REACTOR	1
6	S1	198 637	CIRCUIT BREAKER/SWITCH 1 amp lighted 120VAC	1
7	W1	048 731	INTERLOCK, cntor NO	1
8		035 049	LINK, connecting contactor term	4
9	W	034 909	CONTACTOR, 4P 115/230V (consisting of)	1
		034 910	COIL	1
		*034 911	KIT, pt	4
10		147 571	HANDLE, carrying	2
11		199 247	SOCKET, relay 11 pin scr term	1
12	TD1	198 636	TIMER, digital al 0-9.99 sec 120 VAC 60 Hz cycle timer	1
13	S3	196 575	SWITCH, rocker SPST 10A 250VAC on-none-off .250 qc	1
14		044 747	HOLDER, fuse crtg 30A 600V	1
15	F1	*128 430	FUSE, crtg 1A 600V	1
16		097 926	KNOB, pointer	1
17		200 264	NAMEPLATE	1
18		199 874	CASE SECTION, front, base, rear	1
19	S2	011 632	SWITCH, rotary 10 pos 50A 300V	1
20		604 102	CONNECTOR, clamp cable 1.000	2
21		010 476	BUSHING, strain relief .625 ID x .570mtg hole	1
22	T2	202 208	TRANSFORMER, control 100VA 230/460V	1
23		053 525	FITTING, brs barbed M 5/16tbg x 1/8NPT	2
		010 323	CLAMP, hose .250-.625clp dia	2
		603 105	HOSE, nprn brd No. 1 x .312 ID (order by ft)	12ft
24		602 965	FITTING, pipe brs tee 1/8NPT	1
25	AS1	199 109	VALVE, 115 VAC 2way (5)1/4 nptf piping ports (consisting of)	1
26		199 115	FTG, pipe brs qcon elbow male 1/4 npt	3
27		010 678	FTG, pipe brs elbow st 1/4 NPTL	1
28		602 243	WASHER, flat stl .375	1
		605 787	WASHER, lock stl int tooth .500	1
		010 910	WASHER, flat stl SAE .375	1
29	S5	177 123	SWITCH, pressure oil 4psi NO cont	1

+When ordering a component originally displaying a precautionary label, the label should also be ordered.
*Recommended Spare Parts.

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

☞ *Hardware is common and not available unless listed.*

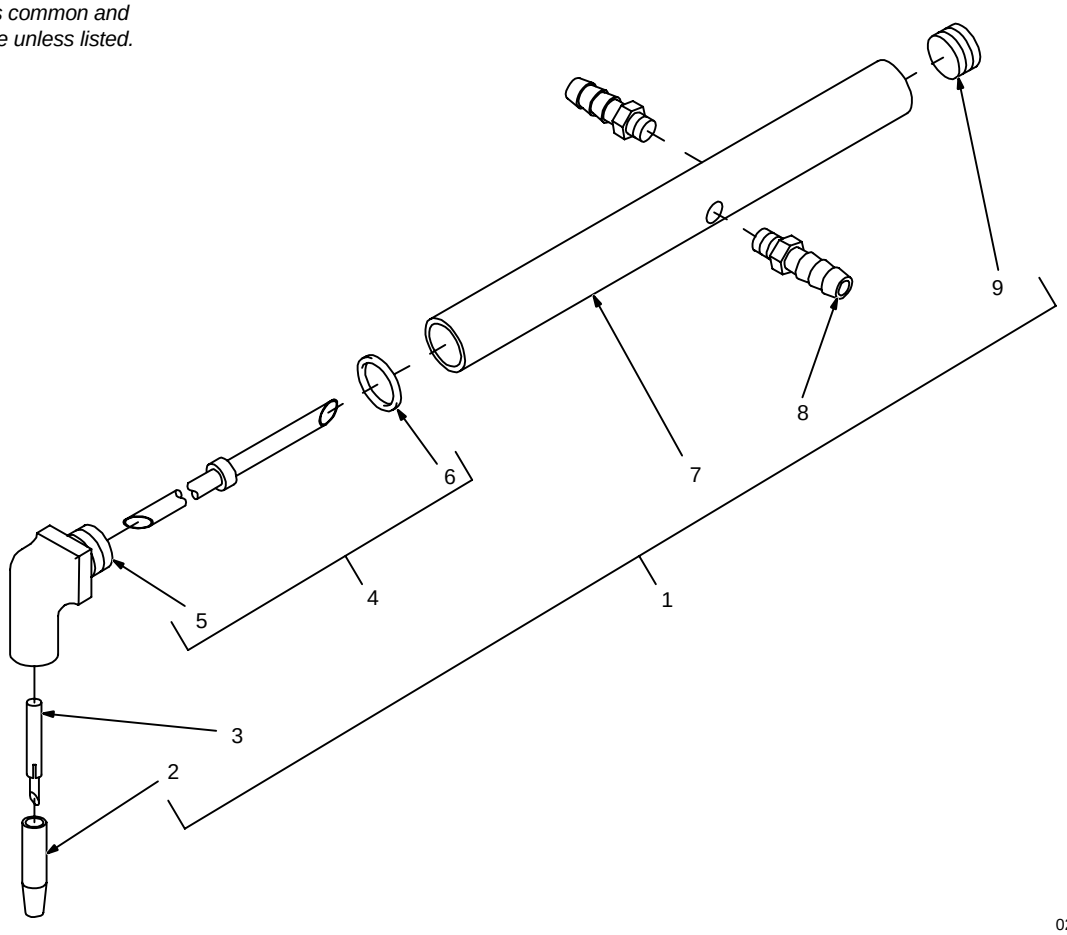


Figure 6-6. Tongs

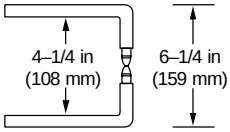
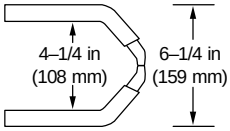
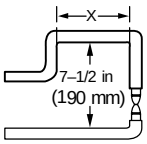
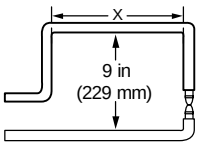
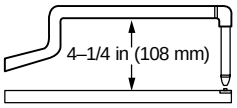
Item No.	Part No.	Description	Holder 45 or 90 Deg	Quantity					
				No. 1 Morse Taper			No. 2 Morse Taper		
				6”	12”	18”	6”	12”	18”

Figure 6-6. Tongs (Optional)

1	027 778	TONG, 6 in (consisting of)	90 deg	2					
1	027 777	TONG, 12 in (consisting of)	90 deg		2				
1	027 776	TONG, 18 in (consisting of)	90 deg			2			
1	027 781	TONG, 12 in (consisting of)	90 deg					2	
1	027 780	TONG, 18 in (consisting of)	90 deg						2
1	027 770	TONG, 6 in (consisting of)	45 deg	2					
1	027 769	TONG, 12 in (consisting of)	45 deg		2				
1	027 768	TONG, 18 in (consisting of)	45 deg			2			
1	027 774	TONG, 6 in (consisting of)	45 deg				2		
1	027 772	TONG, 18 in (consisting of)	45 deg						2
2		TIPS, (see chart)							
3	010 755	TUBE, telescoping	90 deg	1	1	1	1	1	1
3	031 554	TUBE, telescoping	45 deg	1	1	1	1	1	1
4	010 501	TUBE ASSEMBLY, tong (consisting of)	90 deg	1					
4	010 502	TUBE ASSEMBLY, tong (consisting of)	90 deg		1				
4	010 503	TUBE ASSEMBLY, tong (consisting of)	90 deg			1			
4	027 758	TUBE ASSEMBLY, tong (consisting of)	90 deg				1		
4	027 757	TUBE ASSEMBLY, tong (consisting of)	90 deg					1	
4	027 756	TUBE ASSEMBLY, tong (consisting of)	90 deg						1
4	027 766	TUBE ASSEMBLY, tong (consisting of)	45 deg	1					
4	027 765	TUBE ASSEMBLY, tong (consisting of)	45 deg		1				
4	027 764	TUBE ASSEMBLY, tong (consisting of)	45 deg			1			
4	027 762	TUBE ASSEMBLY, tong (consisting of)	45 deg				1		
4	027 761	TUBE ASSEMBLY, tong (consisting of)	45 deg					1	
4	027 760	TUBE ASSEMBLY, tong (consisting of)	45 deg						1
5	010 734	HOLDER, tip	90 deg	1	1	1			
5	010 735	HOLDER, tip	90 deg				1	1	1
5	010 753	HOLDER, tip	45 deg	1	1	1			
5	010 754	HOLDER, tip	45 deg				1	1	1
6	603 090	O-RING, .625 ID x .812 OD	All	1	1	1	1	1	1
7	010 498	TUBE, connecting 6 in tong	All	1			1		
7	010 499	TUBE, connecting 12 in tong	All		1			1	
7	010 500	TUBE, connecting 18 in tong	All			1			1
8	053 525	FITTING, brs-barbed M 5/16tbg x 1/8NPT	All	2	2	2	2	2	2
9	010 758	FITTING, pipe brs skt hd 3/8NPT	All	1	1	1	1	1	1

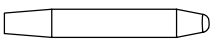
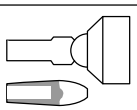
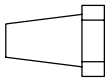
To maintain the factory original performance of your equipment, use only Manufacturer’s Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

Tongs and Tips (Must be ordered separately from spot welders. One pair of tips are supplied with each set of tongs.)

TONGS	TONG LENGTH 6 in (150 mm)	TONG LENGTH 12 in (304 mm)	TONG LENGTH 18 in (457 mm)	TIPS INCLUDED
 STANDARD 90° No. 1 Morse Taper No. 2 Morse Taper	**#040 218** –	**#040 219** –	**#040 220** **#041 001**	**#040 223** **#040 308**
 STANDARD 45° No. 1 Morse Taper No. 2 Morse Taper	– –	**#041 004** –	**#041 005** **#040 296**	**#040 851** **#040 225**
 TT–6W No. 2 Morse Taper	–	–	**#041 838**	**#040 308**
 TT–9W No. 2 Morse Taper	–	–	**#041 840**	**#040 308**
 SW–12	–	**#071 465**	–	No. 1 Pointed **#071 466** Top Flat Threaded **#071 467** Bottom

Notes for tongs and tips:

- *Tongs and tips shown to the left can be used with all PSW and SSW model spot welders. Recommended max. tong length is 18 in (457 mm).*
- *Tong throat–height dimension for standard 90° and 45° tongs is 4–1/4 in (108 mm). Throat length is measured from the center of the spot tips to the front water hose connection. X = tong length.*
- *One set of tips is supplied with each set of tongs.*
- *Tips are made of RWMA Class 2 alloy .*
- *Maximum welding capabilities are obtained with minimum tong length.*
- *MT= Morse Taper.*
- *No. 1 Morse Taper has smaller diameter than No. 2 Morse Taper.*

TIPS	QUANTITY	WHERE USED
No. 1 MT (Pointed) **#040 223**	2 tips	Standard No. 1 Tongs, 90°
No. 1 MT (Offset) **#040 224**	2 tips	Standard No. 1 Tongs, 90°
No. 2 MT (Pointed) **#040 308**	2 tips	Standard No. 2 Tongs, 90° TT–6W Tongs TT–9W Tongs
No. 1 MT (Offset) **#040 851**	2 tips	Standard No. 1 Tongs, 45°
No. 1 MT (Offset) **#040 226**	2 tips	Standard No. 1 Tongs, 90°
No. 1 MT (Offset) **#040 298**	2 tips	Standard No. 1 Tongs, 90°
No. 2 MT (Offset) **#040 225**	2 tips	Standard No. 2 Tongs, 45°
 No. 1 MT (Pointed) **#071 466**	1 tip for top tong	SW–12 Tong
Threaded (Flat) **#071 343**	1 tip for bottom tong	SW–12 Tong (optional)
Threaded (Flat) **#071 467**	1 tip for bottom tong	SW–12 Tong
 No. 1 MT (Flat Swivel Tip) Matching Pointed Tip **#040 216**	2 tips	Standard No. 1 Tongs, 90°
 Adapter (adapts No. 1 Morse Taper Tip to No. 2 receptacle) **#040 227**	2 adapters	Standard No. 2 Tongs, 90° TT–6W Tongs (top) TT–9W Tongs (top)

Notes

Notes

Warranty Questions?

Call
1-800-4-A-MILLER
for your local
Miller distributor.

Your distributor also gives you ...

Service
You always get the fast, reliable response you need. Most replacement parts can be in your hands in 24 hours.

Support
Need fast answers to the tough welding questions? Contact your distributor. The expertise of the distributor and Miller is there to help you, every step of the way.

Miller

TRUE BLUE® WARRANTY

Effective January 1, 2002
(Equipment with a serial number preface of "LC" or newer)

This limited warranty supersedes all previous Miller warranties and is exclusive with no other guarantees or warranties expressed or implied.

LIMITED WARRANTY – Subject to the terms and conditions below, Miller Electric Mfg. Co., Appleton, Wisconsin, warrants to its original retail purchaser that new Miller equipment sold after the effective date of this limited warranty is free of defects in material and workmanship at the time it is shipped by Miller. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS.

Within the warranty periods listed below, Miller will repair or replace any warranted parts or components that fail due to such defects in material or workmanship. Miller must be notified in writing within thirty (30) days of such defect or failure, at which time Miller will provide instructions on the warranty claim procedures to be followed.

Miller shall honor warranty claims on warranted equipment listed below in the event of such a failure within the warranty time periods. All warranty time periods start on the date that the equipment was delivered to the original retail purchaser, or one year after the equipment is sent to a North American distributor or eighteen months after the equipment is sent to an International distributor.

1. 5 Years Parts – 3 Years Labor
   * Original main power rectifiers
   * Inverters (input and output rectifiers only)
2. 3 Years — Parts and Labor
   * Transformer/Rectifier Power Sources
   * Plasma Arc Cutting Power Sources
   * Semi-Automatic and Automatic Wire Feeders
   * Inverter Power Supplies
   * Intellitig
   * Engine Driven Welding Generators **(NOTE: Engines are warranted separately by the engine manufacturer.)**
3. 1 Year — Parts and Labor Unless Specified
   * DS-2 Wire Feeder
   * Motor Driven Guns (w/exception of Spoolmate Spoolguns)
   * Process Controllers
   * Positioners and Controllers
   * Automatic Motion Devices
   * RFCS Foot Controls
   * Induction Heating Power Sources
   * Water Coolant Systems
   * Flowgauge and Flowmeter Regulators (No Labor)
   * HF Units
   * Grids
   * Maxstar 85, 140
   * Spot Welders
   * Load Banks
   * Racks
   * Running Gear/Trailers
   * Plasma Cutting Torches (except APT & SAF Models)
   * Field Options
     (NOTE: Field options are covered under True Blue® for the remaining warranty period of the product they are installed in, or for a minimum of one year — whichever is greater.)
4. 6 Months — Batteries
5. 90 Days — Parts
   * MIG Guns/TIG Torches
   * Induction Heating Coils and Blankets
   * APT, ZIPCUT & PLAZCUT Model Plasma Cutting Torches
   * Remote Controls
   * Accessory Kits
   * Replacement Parts (No labor)
   * Spoolmate Spoolguns
   * Canvas Covers

Miller's True Blue® Limited Warranty shall not apply to:

1. **Consumable components; such as contact tips, cutting nozzles, contactors, brushes, slip rings, relays or parts that fail due to normal wear. (Exception: brushes, slip rings, and relays are covered on Bobcat, Trailblazer, and Legend models.)**
2. Items furnished by Miller, but manufactured by others, such as engines or trade accessories. These items are covered by the manufacturer's warranty, if any.
3. Equipment that has been modified by any party other than Miller, or equipment that has been improperly installed, improperly operated or misused based upon industry standards, or equipment which has not had reasonable and necessary maintenance, or equipment which has been used for operation outside of the specifications for the equipment.

MILLER PRODUCTS ARE INTENDED FOR PURCHASE AND USE BY COMMERCIAL/INDUSTRIAL USERS AND PERSONS TRAINED AND EXPERIENCED IN THE USE AND MAINTENANCE OF WELDING EQUIPMENT.

In the event of a warranty claim covered by this warranty, the exclusive remedies shall be, at Miller's option: (1) repair; or (2) replacement; or, where authorized in writing by Miller in appropriate cases, (3) the reasonable cost of repair or replacement at an authorized Miller service station; or (4) payment of or credit for the purchase price (less reasonable depreciation based upon actual use) upon return of the goods at customer's risk and expense. Miller's option of repair or replacement will be F.O.B., Factory at Appleton, Wisconsin, or F.O.B. at a Miller authorized service facility as determined by Miller. Therefore no compensation or reimbursement for transportation costs of any kind will be allowed.

TO THE EXTENT PERMITTED BY LAW, THE REMEDIES PROVIDED HEREIN ARE THE SOLE AND EXCLUSIVE REMEDIES. IN NO EVENT SHALL MILLER BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING LOSS OF PROFIT), WHETHER BASED ON CONTRACT, TORT OR ANY OTHER LEGAL THEORY.

ANY EXPRESS WARRANTY NOT PROVIDED HEREIN AND ANY IMPLIED WARRANTY, GUARANTY OR REPRESENTATION AS TO PERFORMANCE, AND ANY REMEDY FOR BREACH OF CONTRACT TORT OR ANY OTHER LEGAL THEORY WHICH, BUT FOR THIS PROVISION, MIGHT ARISE BY IMPLICATION, OPERATION OF LAW, CUSTOM OF TRADE OR COURSE OF DEALING, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE, WITH RESPECT TO ANY AND ALL EQUIPMENT FURNISHED BY MILLER IS EXCLUDED AND DISCLAIMED BY MILLER.

Some states in the U.S.A. do not allow limitations of how long an implied warranty lasts, or the exclusion of incidental, indirect, special or consequential damages, so the above limitation or exclusion may not apply to you. This warranty provides specific legal rights, and other rights may be available, but may vary from state to state.

In Canada, legislation in some provinces provides for certain additional warranties or remedies other than as stated herein, and to the extent that they may not be waived, the limitations and exclusions set out above may not apply. This Limited Warranty provides specific legal rights, and other rights may be available, but may vary from province to province.

Owner's Record

Please complete and retain with your personal records.

Model Name Serial/Style Number

Purchase Date (Date which equipment was delivered to original customer.)

Distributor

Address

City

State Zip

For Service

Call 1-800-4-A-Miller or see our website at www.MillerWelds.com to locate a DISTRIBUTOR or SERVICE AGENCY near you.

Always provide Model Name and Serial/Style Number.

Contact your Distributor for:	Welding Supplies and Consumables
	Options and Accessories
	Personal Safety Equipment
	Service and Repair
	Replacement Parts
	Training (Schools, Videos, Books)
	Technical Manuals (Servicing Information and Parts)
	Circuit Diagrams
	Welding Process Handbooks
Contact the Delivering Carrier for:	File a claim for loss or damage during shipment.
For assistance in filing or settling claims, contact your distributor and/or equipment manufacturer's Transportation Department.	

Miller Electric Mfg. Co.
An Illinois Tool Works Company
1635 West Spencer Street
Appleton, WI 54914 USA

International Headquarters–USA
USA Phone: 920-735-4505 Auto-Attended
USA & Canada FAX: 920-735-4134
International FAX: 920-735-4125

European Headquarters – United Kingdom
Phone: 44 (0) 1204-593493
FAX: 44 (0) 1204-598066

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